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# AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

VOL. 14, No. 24. WEEKLY. | NEW YORK, THURSDAY, JUNE 11, 1891. | $3.00 per Annum. SINGLE COPIES 6 CENTS.


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## New Self-contained Engine.

The engravings on this page and on page 2 represent the self-contained engine recently brought out by the Atlas Engine Works, Indianapolis, Ind. It may be stated that this engine is the outcome of a demand from many customers for an engine that should be complete when set down upon anything in reason in the way of a foundation, being in this respect self-contained as compared with side-crank engines requiring an out-board pillow block.

These engines are built in two types, viz., the automatic cut-off engine, as shown in the perspective cut on this page, and the throttling engine, as shown in the corresponding cut on page 2. Detail cuts of the two types, some of them common to both, and others not common, are shown on the two pages named.

Speaking of the parts common to both types, the crank-shaft on page 2, also the connecting rod, are examples. But little need be said about these parts. The cut of crank-shaft gives a good idea of the disposition of metal in the frame at and near the main bearings. It is a "built-up" counter-balanced crank with a composite crank-pin. That is, the body of the pin is of iron, which is believed to be more reliable than steel for resisting strains and shocks. Around the iron at the center a steel collar is welded, because steel is believed to give a better wearing surface.

The connecting rod is of the locomotive type, the strap, however, being in three parts, as shown in the engraving. In the construction, the top and bottom pieces are counterbored, into which corresponding projections on the end piece are fitted. These relieve the end bolt from shearing stress, leaving it the duty only of holding the parts of the strap together.

The valve for the throttling engine is an ordinary flat slide, and requires no description.

The valve for the automatic engine is shown in Figs. 1, 2 and 3, page 1. It will be seen that it is a balanced slide, in that it is relieved from all pressure against the seat. Referring to the engravings named, the valve, when in working position, will be seen to be covered by a hood with false ports corresponding to the ports in the valve face. These false ports being in direct communication with the real ports in the valve face, equalize the pressure on the two sides of the valve. Besides doing this, these false ports provide, in effect, a larger and quicker port opening for a given valve travel. The two ends of the valve being of equal area, make the valve in balance in that respect. Of course such a valve will work without friction, except the trifling amount due to its weight.

FIG. 1

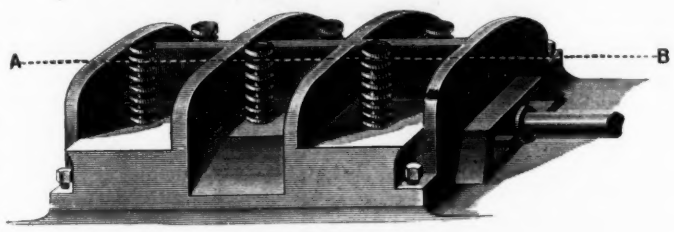



FIG. 2

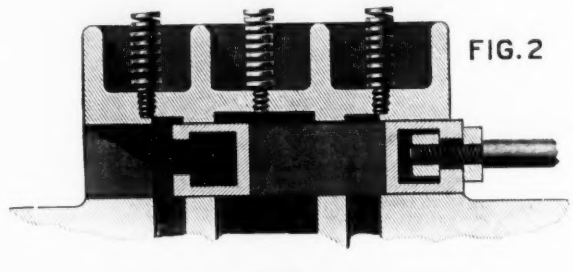
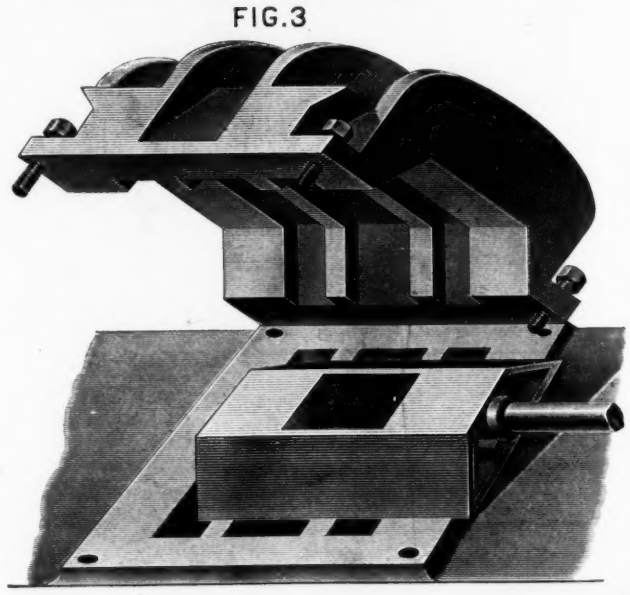
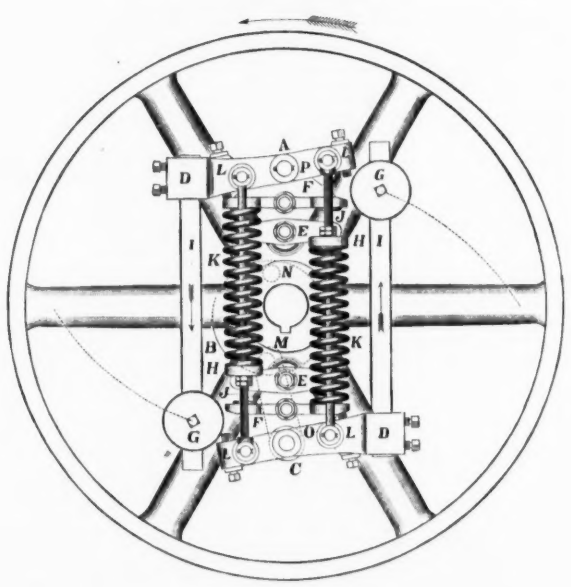
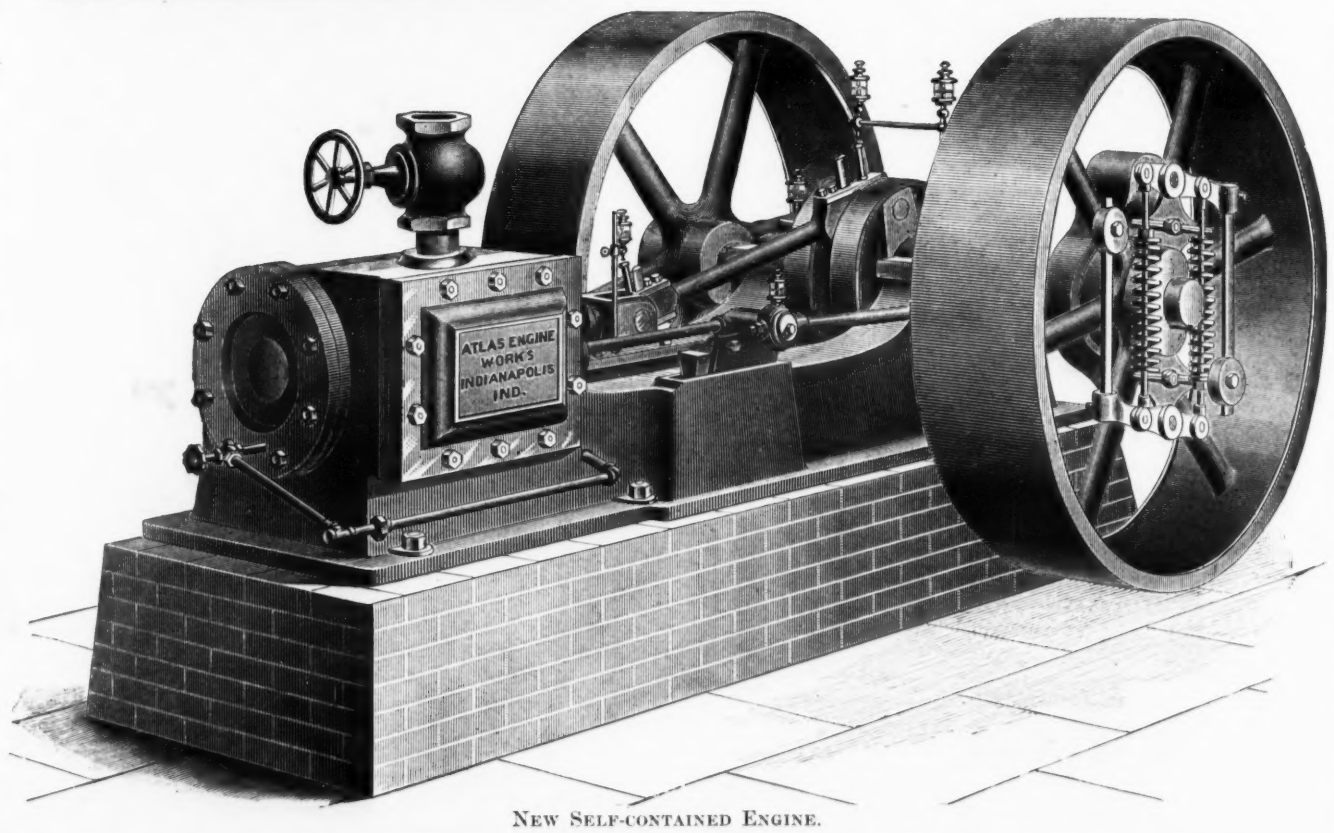


FIG. 3






NEW SELF-CONTAINED ENGINE.

The hood that covers the valve is not held firmly down by the bolts shown; on the contrary, these bolts serve to keep it in position otherwise, but not to its seat against the cylinder; in other words, the hood is free to lift a short distance on these bolts, being resisted only by the springs shown. Hence, in the case of water in the cylinder, the valve, carrying with it the hood, can readily leave the seat, the springs again returning it, the bolts guiding the hood. It will be readily seen how, should wear occur, the valve may be refitted by ordinary machine processes.

The governor for the throttling engine may be of any approved type. The governor for the automatic engine is shown on this page. Long springs are employed, and the leverage is such as to give great power, while the construction is such as to secure the necessary sensitiveness. An inspection of the engraving will show the manner in which the governor operates.

Of the general construction of the engine, the engravings will give a good idea. The cylinder is not overhung, but when bolted to place is part of the frame, as it were, and the rigidity of the frame is such as to allow the engine to be set on a very unsubstantial foundation, and still preserve the essential alignments. In fact, we have seen them operated placed upright against the wall of a building.

All parts of these engines are made interchangeable, being *manufactured*, as that term has come to be understood. They are made in sizes from 7 inches diameter of cylinder up, varying by one inch, and are said to be capable of a piston speed of from 600 to 700 feet per minute without special preparation.

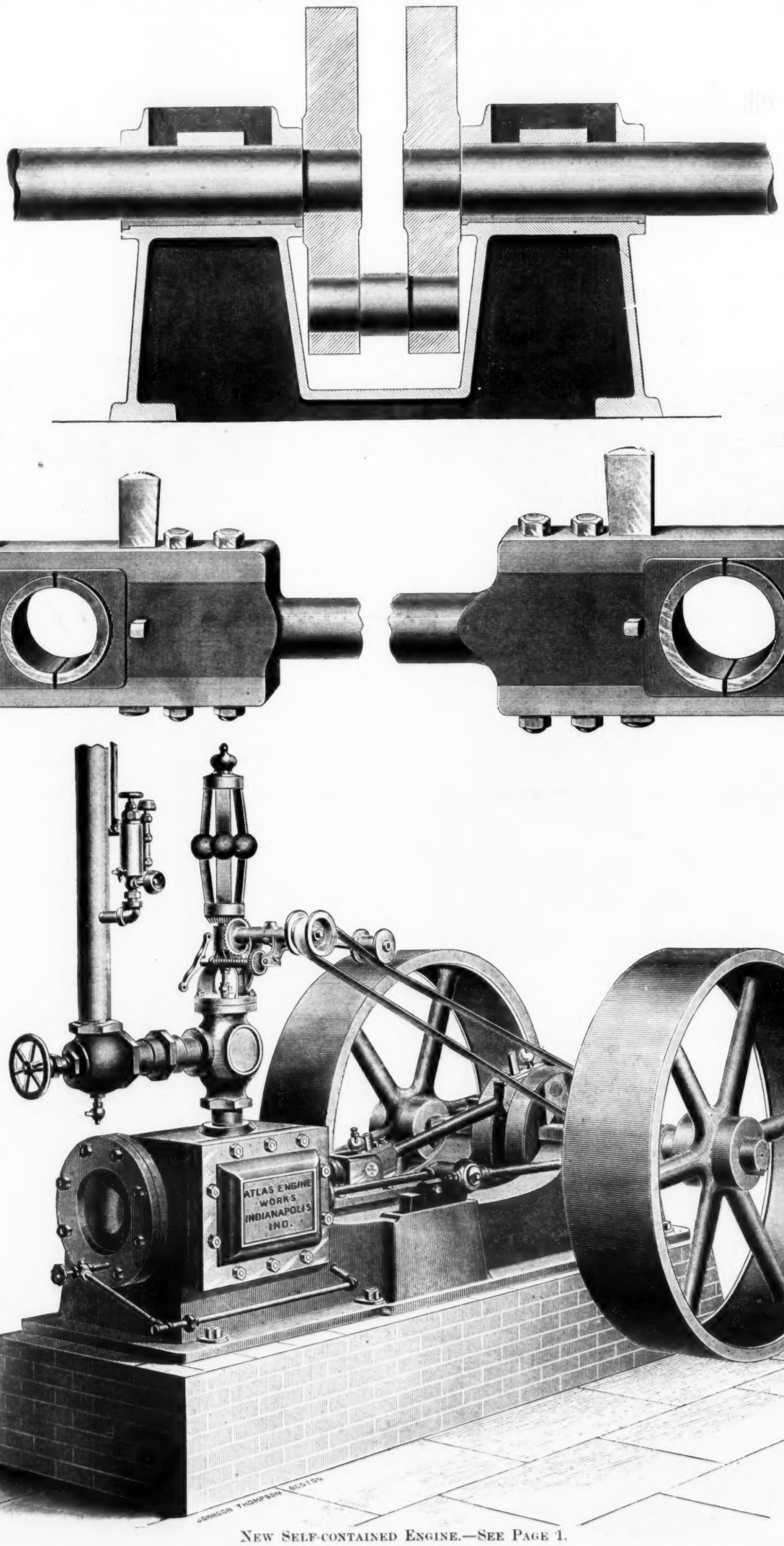
### Shrinkage of Box Wood.

The inexperienced artisan who uses box wood may frequently be annoyed by its unequal shrinkage. Mr. H. Wells, manufacturer of printers' cases and wood type, 8 Spruce street, New York, has experimented considerably with box wood, and brought to our office two strips cut from the same log, which showed a difference in shrinkage somewhat surprising, and he states that these are by no means exceptional cases. Each strip was planed to $\frac{5}{16}$ of an inch square, and the original length of both was exactly 16 inches. Although both strips were cut from the same log, as stated before, one of them is of a lighter color than the other. The shrinkage in length of the light colored strip is scarcely perceptible, while that of the dark colored one is fully $\frac{1}{4}$ of an inch. This indicates that great care should be taken in the proper selection of material for box wood rules, and for other purposes where a difference in shrinkage is not permissible; and that the color of the wood may, to some extent, be taken as a guide in making the selection.

There arrived in this place, over the Pennsylvania Railroad, a casting for the Cambria Iron Company which is especially worthy of note. It is a half section of a fly wheel for the new billet-mill. The casting was made at the Southwark Foundry and Machine Works, Philadelphia. It weighs 90,000 pounds, and was transported on a special car borrowed by the railroad company for the purpose from the Baldwin Locomotive Works, the company having no cars of its own with a capacity above 80,000 pounds. The casting will be unloaded early next week, and the car will then be returned to Philadelphia for the other half of the wheel. The total weight of the wheel complete will be 180,000 pounds, or ninety net tons. The agent of the railroad company here, F. S. Deckert, says that this is probably the largest casting ever transported over the Pennsylvania line.—*Johnstown Tribune.*

It is stated that some of the English iron founders introduce a thin sheet of iron in the center of the mold before casting; the object of this is to obtain stronger work. The idea was first applied to casting of thin plates for cooking stoves, but the process is now applied to the casting of large iron pipes. It is claimed that a plate one-quarterof an inch thick, cast with a wrought-iron perforated sheet of No. 27 wire gauge, made it six times stronger than a plate cast without this core.

Every action of the Boiler Manufacturers Association, that recently met at St. Louis, and every expression that we heard on the subject, were substantially in line with the efforts of the N. A. S. E. to bring about inspection of boilers and engineers. The N. A. S. E. should snow under everything in the way of personal ambition in the matter of officials, and work with the boiler manufacturers to secure the desired end.




NEW SELF-CONTAINED ENGINE.—SEE PAGE 1.

### Uncle Ben's Letters.

No. 3.

*Dear Tom:*

I am sorry to tell you that, unless human nature in the Eagle Iron Works is different from what it is in the average of all old shops, you will find that before you are in your true position, with all things running smoothly, you will have to discharge one or two of the most prominent men about the place.

With all the kindness and tact that you can possibly display, you will be apt to discover enemies among your force. These may be any or all of the following:

1st. The machinist who thinks he should have been made "boss," and means to show the management what a mistake they made, and that neither you, nor any one else, knows as much about those pumps as he does. "Didn't I get up that piston ring joint? If the new boss is so much smarter than anybody else let him find out things for himself. I sha'n't tell him anything I can help. Maybe they'll see then."

2d. The head boiler maker, who thinks you, of course, are not posted in his business, and couldn't mark off a pipe elbow. Why? Because you're only a machinist anyway; and, besides, he don't see how any stranger can know as much as he does. And he has told the riveters they needn't work so hard now; the new boss is a greenhorn and won't know. After about three weeks you find that this worthy has told an office boy (the treasurer's cousin) that they can't flange those heads very fast because the blower of the forge is out of order, and he don't know why the boss don't have it fixed. N. B.—You have heard no complaint about the blower, and it isn't out of order.

3d. The foundry foreman, who tells you the first week that he didn't think so much of Dunn as some of them did, because he would keep that botch pattern maker. Every thing that this man does, you find, is wrong, in the molder's estimation; and until you replace said molder by some one else, the loss of castings will be something wonderful.

4th. Anybody else in the works who shows a disposition to hang back and not render you the heartiest assistance in making the whole thing a success.

I do not know any of the people where you are going, and I do not mean, Tom, to cast any reflections upon any class of mechanics. You know that. I am proud of being a mechanic myself. But I mean that wherever a man shows an unfriendly feeling toward you, especially if he is tricky and tries to undermine you, you must part company at once, or you'll regret it. And whenever the best man in the place gets to thinking that you can't get along without him, why, then you can and you must.

You are in the most conspicuous position of any man in the works; and you will be certain to find, if there is one of the principal employes who has made up his mind to dislike you, that he has poisoned the minds of all

the apprentices and helpers and everybody that he can reach; and the fact that this man is your adversary will be publicly known, in the shop, long before it comes to your ears, or to your notice. But after you have quietly dismissed the unquiet one, and replaced him by a man of your own choosing, a marvelous peace will settle down upon the establishment and upon your own mind.

Whenever one of your men, good, bad or indifferent, is fully persuaded that he ought to be paid more, take some action very soon. Don't put him off by telling him that you'll "think about it." Either the man really ought to get more, or to be given an opportunity to do so somewhere else.

* * * * * *

Don't act and talk like a polytechnic professor continually among your men. Very likely some of them know more about conic sections than you do. But always be ready with a kind and patient explanation of any problem, or process, when it is asked for. Nothing is so contemptible, and such a mark of real, solid, ignorant meanness, as any pretense of mystery in this business. I well remember my first boss, Wobblegear, who ran an old scrap-heap in my native village. I began "the machine business" with him, and was there just four weeks. Then I asked him one day to tell me how to determine the circumference of a circle from its diameter. The old tinker looked me over for a minute with the most patronizing contempt, and then said, "Why, my boy, that's one of the secrets of this business. It took me a good many years to learn them things, and I don't mean to give 'em away. You keep right on grindin' them plow p'ints."

I did, until night. Then I started for Providence. I never saw old Wobblegear again.

UNCLE BEN.

### A Knowing Foreman.

SCENE—FOUNDRY IN WESTERN CITY.

Foreman—"John, I have a pattern for a B stave; must have eight this afternoon; go out and get in a flask."

John—"What length is it?"

Foreman—"Oh, I don't know. I will go and measure." (Returns.) "It is 13 feet 6 inches."

John—"Why not put it in open sand; can't make eight in flasks this afternoon."

Foreman—"Can you make them quicker in open sand?"

John—"Of course; three times as quick."

(Foreman goes out after pattern. Superintendent enters, stops and talks with John on his floor. Enter Foreman with pattern.)

Foreman—"Here, John, put eight of this in open sand; you can make them a good deal quicker that way than you can in flasks."—"BRICK" in *Machinery Molders' Journal.*

### Automatic Spoke Lathe.

The accompanying engraving represents a spoke lathe, in which the aim has been to make the machine as nearly automatic in its action as the nature of the work will allow, and it is so constructed that the operator has nothing to do but remove the finished spoke and put in the stock, the carriage being automatically returned to its place, while the vibrating frame is thrown forward to clear the knives. At starting, the frame is automatically lifted to the cut, which, in a machine turning from 2,400 to 2,700 spokes a day, and having a frame which necessarily weighs about 35 pounds, is an important item.

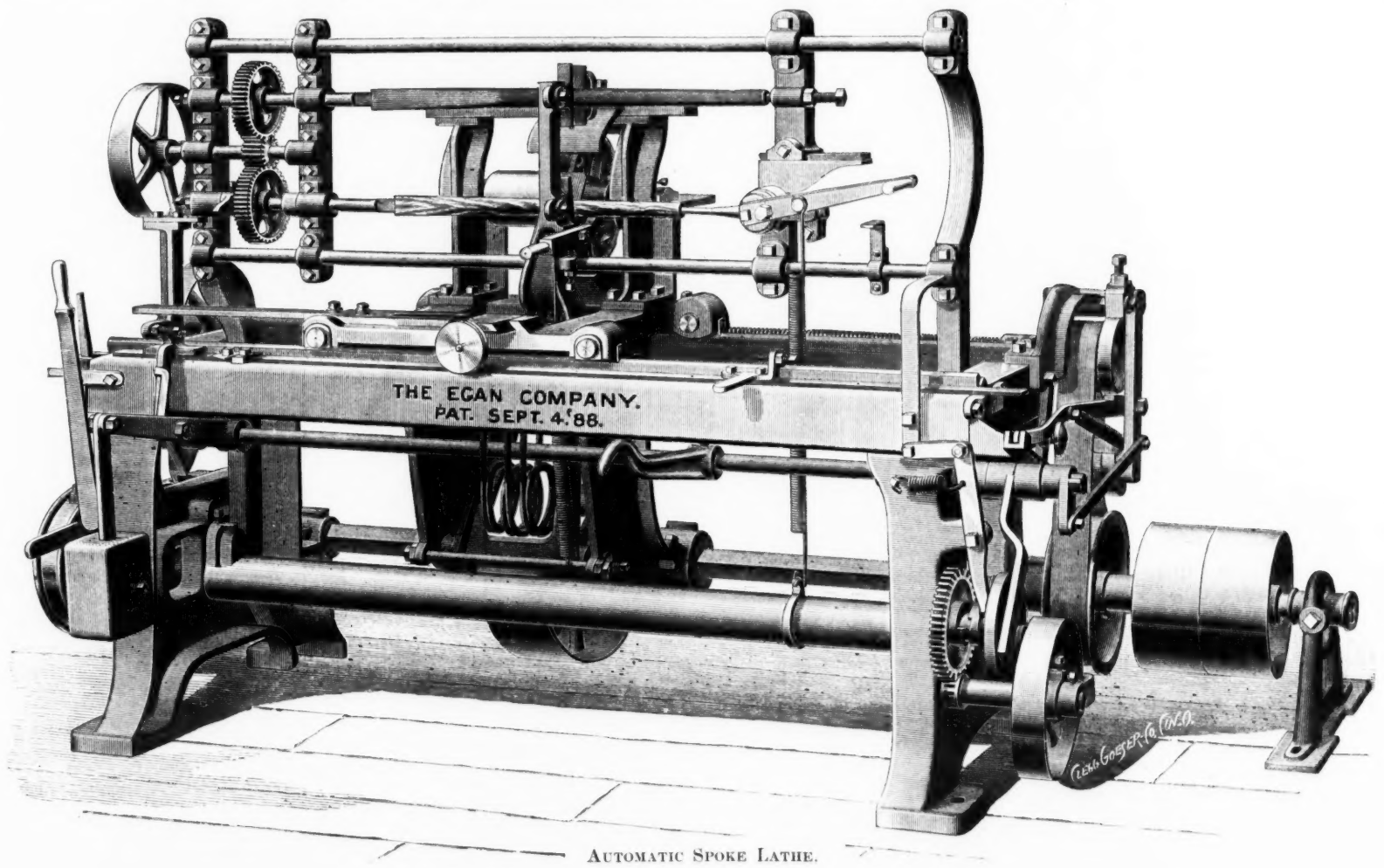
The bed is made wide, and of such form as to prevent, so far as possible, the lodgment of chips. The carriage rests on four large steel rollers, and is provided with adjustable gibs to the main frame by which side play can be entirely prevented.

The head is of new design, with a combination of hook and gouge knives. It is of steel, and turned all over, to insure running balance.

The vibrating frame is cast hollow, and is connected across the top by hydraulic pipe, the object being in this to combine strength with lightness for rapid vibration. Adjustable trunnion boxes are provided for changing the size of spoke, while the back center is so made that various lengths of spokes can be made from the same pattern.

The spring pressure bar is held to position with three spiral springs, connected to carriage with slide working in planed ways, operated by hand-wheel and screw, and so constructed that any work, from the lightest buggy spoke to the heaviest wagon spoke, can be turned with ease. The feed is by a screw, and the mechanism is so arranged that the rate of feed is changed at the throat of the spoke, or it may be uniform all the way, as may be desired. By touching a small lever the feed can be thrown out at any point for setting the rests or truing the knives. The countershaft, which is near the floor at the back, is made square and fitted with a sleeve for the pulley, so that keyseating is avoided.

The machine is built by The Egan Company, Cincinnati, Ohio.




AUTOMATIC SPOKE LATHE.

### The Naval Exhibition in London.

Any American engineer visiting Europe this year should not fail to visit the English Naval Exhibition at Chelsea. Apart from the historical character, interesting more especially to Englishmen only, there is very much of general interest to the engineer and machinist. Useless as are guns in any true sense, they afford examples of workmanship and finish, which no machinist can fail to note with interest. Especially is this the case with torpedoes, many of which are shown, with their internal arrangements and air-compressing machinery for the same.

A fine example of boiler plate is shown by Messrs. Colville, of Glasgow. It is, of course, of steel, and is 42 feet in length, 6½ feet wide and 1½ inch thick, and there are several boiler ends, pierced and flanged for furnace and shell connection, which deserve notice. Whitworths, of Manchester, show a piece of 19-inch steel compressed shafting with flanged end, 54 feet in length, and a solid (weldless) ring of plate for a boiler shell, forged or rolled from a single pierced ingot. It is of ¾-inch plate, and 11 feet diameter.

The Parkhead Forge shows a three-throw crank-shaft, 30 feet in length and 15¾ diameter, and a shockingly ill-used connecting rod, bent and battered, which is catalogued as from the "City of Paris" after her noted breakdown.

There is a full sized model, 170 feet in height, of the new Eddystone lighthouse, with a powerful electric lamp throwing 16 divergent beams of light. Electric lighting is a special feature of the exhibition, and those interested in this branch of engineering should note the dynamo-room. This measures 48x21 feet only, but with a visitors' passage 68x29 feet. This small space contains comfortably 1,100 H. P.

There are two groups of engines. In one group are three direct driving 300 H. P. Willans central valve engines. They run at 350 revolutions when up to speed, and drive each a Siemens dynamo of low tension 120 volts, delivering 1,500 amperes of current, the total efficiency being 86 per cent., *i. e.*, they deliver 86 H. P. at the machine terminals for each 100 I. H. P. in the cylinders, at full load, but the dynamos themselves are stated as having an efficiency of 94 per cent.

The steam pressure is 120 pounds, and the water consumption is stated as 20 pounds per I. H. P., per hour (non-condensing). Messrs. Willans claim that with 160 pounds pressure these engines or similar ones will not consume over 14 pounds of water per hour, per I. H. P.

The other group of engines and dynamos are also three in number, but smaller in size, being equal to a customary man-of-war installation, but with slightly larger dynamo, equal to 400 amperes at 120 volts E. M. F., at 400 revolutions per minute, whereas the navy size is of 80 volts E. M. F. only.

There is a separate engine for the lighthouse, and other smaller engines.

The boilers are 10 in number, of locomotive type, each with 700 feet of heating surface, and equal to 3,000 pounds evaporation per hour. The pressure is 140, test pressure 250.

The larger engines are said to be the largest direct coupled electric engines in existence of the high speed type, and the group of three, with six of the boilers, would be equal to supplying current for 8,000 lamps of 16 candle power. Needless to say there are many hundred models of ships both ancient and modern, one model especially of the "Victoria," on a scale of 1 inch to a foot, is noticeable as being so highly finished and so perfect in detail, ready for action. This model is in Armstrong's special exhibits, and is said to have cost $10,000, enough to have built a good old-fashioned ship not so very long ago.

Amongst Arctic relics are some brought back in 1880, by Lieut. Schwatka, of the U. S.

Maudslay Sons & Field exhibit Maudslay's invention, the screw cutting lathe, with Maudslay's original slide rest, which is believed to be the first lathe made for sliding and screw cutting.

Hawthorn, of New Castle, shows the models of the engines for the "Sardegua" Italian ironclad, which in all has a motive power of 25,000, the biggest power ever put into one ship.

No. 4,515 (1) is a model of the "John Randolph," date 1834. Length, 110 feet; breadth, 22 feet; depth, 7½ feet; tonnage, 249 tons; 60 H. P. This was the first *iron* steamer seen in America. It was built at Birkenhead, and shipped in pieces from Liv-

erpool, and ran on the Savannah River many years as a tugboat.

There are many other exhibits of great interest, of which we may have more to say in the future.

## Improved Gang Slitting Machine.

We illustrate herewith a machine for slitting tin plates or other light sheet metal into strips of any desired width, its chief use being by the makers of cans, such as used for fruits, vegetables, paints, etc. The cutting is done by rotary knives, which are made unusually large, so that they are capable of running a long time without grinding.

The usual feeding rolls which are placed in front and back of the cutters are replaced by rolls which run loosely on the hubs of the cutting rolls, and are held in position by suitable collars and flanges. The tension or pressure on these rolls is readily adjusted by a single set-screw, and in the position which they occupy, they act as strippers, as well as feed rolls, so that the ordinary strippers are dispensed with, and the machine is rendered comparatively simple. The machine will take in a sheet up to 28 inches wide, and can be arranged to cut it into as many as eight strips of varying or uniform widths, as may be desired. The capacity of the machine is, of course, very great, and the work done in both quantity and quality far surpasses that of squaring shears. It is built by the Toledo Machine and Tool Company, Toledo, Ohio.

## From the Shops.

*(Editorial Correspondence.)*

### A GROWING INDIANAPOLIS FIRM.

Some six or seven years ago the AMERICAN MACHINIST illustrated the little shop in which the head of the firm of Hetherington & Berner started in the machine business. It wasn't much of a shop as shops go; in fact, it was indicative of a strong struggle ahead—either that or getting back to day work. Along with this were published cuts of the shops of the firm as they existed at that time. The publication was for the purpose of representing the progress so common in this country. Recently I called at the works and found the trouble of too little room worrying the head. More land has been obtained, and "spreading out" will be next in order.

This firm does a good business in architectural iron work as well as in general machine work, and with an expansive feeling very common as localities west of Pennsylvania are reached, feel the lack of more room. What is crowding them just now more than any single thing is to keep up with their work on embossing machines for wood. This machine embosses various figures on any kind of wood, by means of a roller carrying on it a bronze sleeve on which the figures are cut. This roller is hollow, and is heated by gas. The wood is passed slowly beneath the roller, which is held against the wood with a pressure equal to the requirements, and is easily adjusted as to pressure When the wood has passed the roller it is beautifully embossed according to the configuration of the sleeve, and colored according to the heat employed. It is said that future variations in temperature and moisture do not change the character of the work, which is used in furniture making and for similar purposes.

This firm is putting in new tools, amongst which we noticed a radial drill made at the works. The shops are well equipped for general work.

### WORK IN A CHICAGO SHOP.

The M. C. Bullock Manufacturing Company, of Chicago, is busy as usual, and making improvements by the addition of new tools. One of the tools recently added is a turret machine for threading, inside and outside, drill rods and couplings, used in prospecting, mining, etc. A square thread is employed, and it has not been easy to do this work accurately and with the desired rapidity previous to this, but the machine —furnished by Warner & Swasey, one of their regular machines with some modification—does this and a good deal of other work at a greatly reduced cost.

In addition to mining machinery, this company is finding a good demand for its Corliss engines, simple and compound, and is improving facilities for manufacturing them. I noticed a new tool under construction for boring the cylinder for the piston and valve seats at the same time.

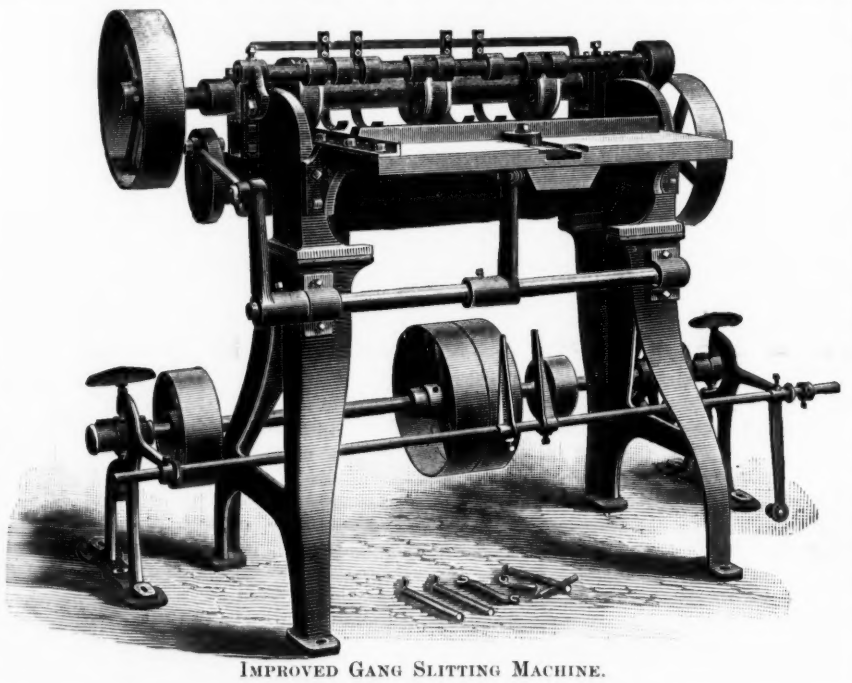
As yet I believe the largest engine this firm has built is one for the car works at Pullman. This engine drives the freight car department, supplying the motive power for making a car every nine minutes. The engine is 32″x60″, has a 30-ton fly wheel 24 feet diameter for a 60″ belt, and makes 63 revolutions per minute.

The second story of the main building of these shops, devoted mostly to the lighter machine work, has a clear space—unobstructed by post or pillar—65x185 feet, which is not common in machine shops.

A heavy beam extends outward from near the top at one end of the shop, and a car track passes this end, enabling machinery to be loaded with facility. An engine, with hoisting drum, on the lower floor, supplies the motive power for hoisting and lowering.

In the drawing-room drawings are made in two sizes only, viz., 16″x26″ and 26″x34″. These drawings are made on cheap paper—both sides of the paper is utilized—and from the tracings two sets of blue prints are made, one of which is mounted on cardboard for use, and the other placed in a fireproof vault. The original drawing is kept till it is found that no alterations are required, then destroyed. The tracings are numbered consecutively, and are further designated and filed in drawers, each particular kind by itself, and by the aid of the index are quickly come at. There is also used a drawing-room order book, in which are entered the orders, and which will show at any time the particular drawing from which the machine—or part—was made. If it is found, as in erecting the machine or elsewhere, that some alteration is required, that alteration is indicated in the drawing-room order book, which becomes valuable in case pieces are wanted for repairs, and also for other purposes of reference. A sketch book is also used. That is, in case something is wanted of which there is not time to make a drawing, a sketch is made in ink and copied into the sketch book. Any change required in this may be made, as in the order book, and a drawing can be made from the sketch book if it is desirable. In any case, it stands as a book of reference.

As before intimated, mining machinery is one of the specialties of this firm, some valuable inventions by Mr. Bullock and by the general superintendent, Mr. J. S. Lane, being utilized. A feature of the Cornish pumps they make is the large valves and reduced lift, which makes an easy and smooth-working pump. They build these pumps both plunger and bucket lift. It is hardly necessary to say that all parts of machines are made standard, some very large standard gauges being required. The tool-room system is about the same as employed in other well-regulated shops, and need not be especially referred to further. The company own abundance of land adjoining the present shops, some of which will doubtless be covered with buildings soon.



IMPROVED GANG SLITTING MACHINE.

### THE LINK BELT MACHINERY COMPANY'S NEW SHOPS.

These shops, at Chicago, in which the company is as yet hardly fairly settled, are quite complete for the purpose for which they were built. The title under which this company transacts business does not fairly —or at least not completely—name its business; for while a great deal of link belt machinery is made, a large amount of work is done in the manufacture of shafting, hangers and pulleys, and especially in rope-driving appliances.

The main shop of the company is 125x460 feet, built on the gallery plan. The central part, between the galleries, is about one-third the entire width, but the galleries are continued around each end, thus covering rather more than two-thirds of the main floor. The clear space is covered by a traveling crane, and hydraulic lifts operate between the main floor and galleries. The pattern and wood-working shop is in one of the galleries, and light machine tools occupy part of the other. Then there are storerooms that occupy other parts of the galleries.

Heating and ventilation is accomplished by Sturtevant fans, driven by independent engines—that is, the Sturtevant system is employed.

Of course, a firm doing an extensive business in rope-driving machinery will use that system of driving as much as is practicable in its own works—take its own medicine, as it were. So it is not surprising to find this to be the case at these works.

The engine and boiler-room adjoins the main shop at one side of it, and the power is taken from the main engine—of the Corliss type—to a main line under one of the galleries, by means of nine turns of one-inch rope. From one end of this shaft power is taken to a second line, under the other gallery, by means of six turns of a rope. Then rope is used in driving shafts at right angles to these shafts, and is in other ways employed for driving machines and machinery. My observations were that this rope driving was remarkably efficient, and free from all shock or jar.

The foundry is 80x210 feet, the machinery—air compressor, cranes, etc.—being driven by a separate engine, here again rope driving being in use. Pulley molding machines are employed in the foundry, and pneumatic lifts for lifting copes and for other purposes, with a traveling crane, make the conveniences for doing work good. Altogether the plant is well arranged for turning out work.

### PULLEY AND PULLEY-MAKING MACHINERY.

Twenty years ago Mr. E. A. Delano, a Massachusetts mechanic, gravitated to Chicago, and since then has been mainly engaged in making pulleys, shafting and hangers, and machinery for making pulleys. He builds a machine for turning pulleys in which the driving is done from all the arms of the pulley, which are rigidly clamped for the purpose. The pulley to be turned is placed on a mandrel that extends from the main center of the machine (bushings are employed for different diameters of hole) and the set-screws in the pulleys are set up. This leaves the pulley in exactly the condition it will be in on the shaft upon which it is to be used. Then the drivers are clamped to the arms—which is a short operation—and the strain of turning is taken from the mandrel, which really serves mainly for accurately and quickly centering the pulley. There is a compound rest on each side of the lathe, so that two cutting tools are in use at once, and without interference. These compound rests can be set at any desired angle for crowning pulleys, or for turning bevel gears. They can be moved to further separate them, or to bring them closer together by means of a right and left-hand screw. I saw pulleys that had been turned on one of these machines, with a feed of about three-eighths inch, that were remarkably smooth and quite free of any tell-tale chatters, or indications to spring away from the cut-in places.

Mr. Delano also makes a horizontal boring machine for boring pulleys and similar work. He pins his faith to the horizontal machine as presenting less difficulties in the way of keeping the bearing for the end of bar free from dust and chips. The spindle of this machine has a hole through it, so that the end of the boring bar can pass entirely through it if desirable. The top part of the boring bar head can be fed transversely for facing work, and can be set at any angle for taper boring.

He also builds a machine for drilling and tapping pulleys and other work requiring set-screws. The pulley or other piece to be drilled and tapped is placed upon a mandrel extending out in front of the machine. The top of this mandrel is planed flat, so that a piece having a hole larger than the mandrel will, when placed upon it, be centered when drawn down by the expansion wedge employed.

The drills used in drilling are left-handed. Then, by reversing the motion, the tap has just one-half the speed to the right, which is found to be about the correct thing, while in backing out a quick motion of the tap is obtained. The head carrying the drill and the tap is made so that it will pass between the rim and hub of an ordinary pulley as small as twelve inches diameter, for drilling and tapping it. The machines mentioned are not new, but they are so little known as to make a reference to them not out of place.

### FINE MACHINERY SALESROOMS.

Chicago can undoubtedly boast of the finest machinery saleshouse in the United States—the new rooms of J. A. Fay & Co., 22 to 26 Canal street. The company occupies three floors, each 60x150 feet, and they are literally filled with machinery. One would expect the company's line of manufacture—wood-working machinery—to be the most fully represented, but, as a fact, most of the entire space in the building is given up to metal-working machines, of which there is a remarkable array. We were informed that the display of wood-working machinery was not so complete as usual, owing to crowding at the works to fill a large order from Europe. The lower floor of the building is devoted to heavy machinery, the middle or ground floor to offices and machinery of medium weight, and small tools, and the upper floor to light machinery. An elevator provides for the quick handling of machines. It should have been said that one corner of the lower floor

is occupied by an engine and dynamo that lights the floors; with the glass front, fine finish and general appearance of neatness and cleanliness of the building, and the immense display of machinery inside this building is well worth a visit.

GROWTH OF A NEW ENTERPRISE.

Two and one-half years ago the Capitol Manufacturing Company started in business at Chicago, Ill., employing five men, making a few wrenches, and working at the problem of making bolt-cutting and nut-tapping machinery. To-day the company makes 3,000 wrenches a day—monkey wrenches of all sizes and combinations—many of which find market in Europe. They also make 1,500 screw-drivers a day, and have correspondingly increased their output of bolt cutters. Recently they have brought out a new nut-tapping machine, which has still more recently been improved. This machine, as now made, taps nuts at a surprising speed, and is about as nearly automatic in its operations as it is possible to make a machine. All that is required of the attendant is to shovel nuts into the hopper—press the button as it were—the machine does the rest. One boy can attend to twelve machines.

A new machine has recently been brought out for threading bicycle spokes and other small work. This machine differs essentially from the other threading machines made by the company, and we presume marks a departure from their previous practice. This and several new tools we hope to illustrate for the benefit of our readers in early issues, for which reason we do not enter into further particulars at this time. H.

A southern reader asks us for the name and address of the manufacturers of "Perry's Pneumatic Pump." Same is unknown to us under that name, and we shall be glad to have the information from any one able to furnish it.

## Key-way Cutter.

On this page we give an illustration of a key-way cutting machine which possesses some points of novelty.

Motion is imparted to the tool bar by means of gears which resemble those of a planer, the stroke being limited by adjustable dogs which operate to shift the belts, and the pulleys being so arranged as to give a quick return to the bar in the proportion of 3 to 1.

The guides in which the tool bar and crosshead work are pivoted upon a circular support which is concentric with the main driving shaft, so that they can be turned about this shaft and clamped at any desired angle to the table for planing taper key-ways, and yet the action of the driving mechanism is equally effective in any position. Then the angle may be either way, *i. e.*, so as to make a key-way deepest at the top or deepest at the bottom, and the work can thus be put down with either side up, as is most convenient.

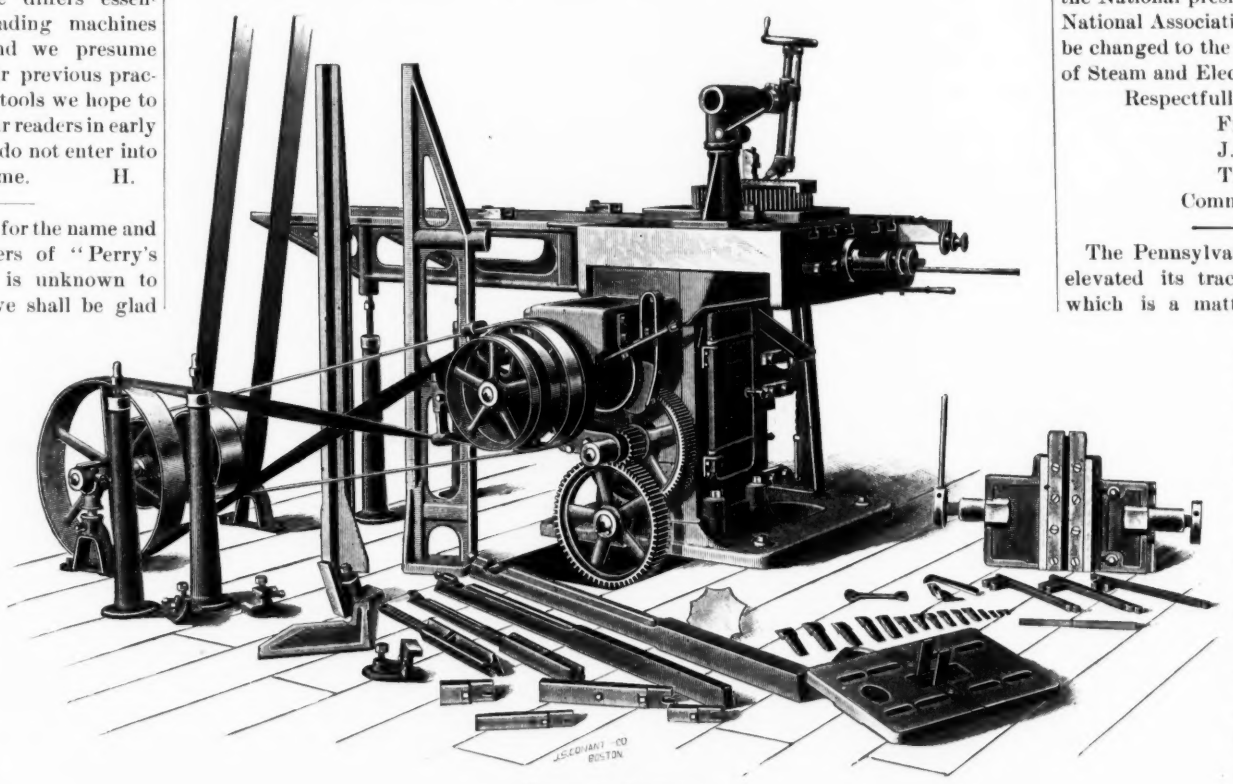
A special patented tool bar is used, which has the slot passing through it for the cutter placed at an angle so that the top rake of the cutter is always secured automatically, as it were, and the making of the cutters becomes almost as simple a matter as making an ordinary cold chisel. Above the cutter there is a rib formed on the bar which nearly fills the key-way being cut, and supports the cutter very nearly out to its cutting edge all round, making it possible to take very heavy cuts with the machine; in fact, some chips we have seen taken with one of these machines were surprisingly heavy ones, and indicated a rare degree of efficiency for such a machine.

Extension bars are provided, by which large work—such as pulleys or fly wheels—can be supported by the rims and held in proper position readily without the necessity for facing the hubs, and there is also a special holding device which consists of a bracket which is fitted to the table by a tongue and groove, and is held in position by two bolts. At the top of this there is an arm which can be clamped in any convenient position, and carries at its extremity a clamping screw, which is worked by the hand-wheel as shown. This device makes the holding of work a simple matter, and nearly dispenses with the necessity for holding down bolts.

A vise is provided, in which keys can be planed up in the same machine, and thus the key-way and the key to fit it can be made complete in the one machine.

All the bearings and the gearing are thoroughly protected from chips and dust, and are made ample in dimensions for the heaviest work.

When desired, a special extension tool bar can be provided, by which key-ways can be cut in chambered or recessed hubs at almost any desired distance from the table. From the figures given as to the time required to cut key-seats with this machine it is evident that, when amount of metal removed is considered, the efficiency is very nearly if not quite equal to that of a modern planer. The machine is built in various sizes by the Morton Manufacturing Co., Muskegon, Mich.



KEY-WAY CUTTER.

## Further Good Accounts from Our New Navy.

A Washington dispatch says: "The naval board which was appointed to conduct the final trial of the new cruiser Newark has completed that duty. The ship was taken 100 miles out at sea from the Norfolk Navy Yard. The weather was dirty and the sea rough; nevertheless the board found that the seagoing qualities of the vessel were of the highest class. She rolled very little, and the machinery worked smoothly. Altogether the members of the board find that the vessel is satisfactory in every respect, and will be one of the finest of the new cruisers."

## A Proposed Engineering Society.

We have received the following, which we publish for the information of all interested:

*Editor American Machinist:*

Please permit me to inform you, for the benefit of your readers, that on the 22d of June, 1891, twenty-five gentlemen, representing the department of mechanical engineering in almost as many different State colleges, will meet at the Ohio State University, Columbus, Ohio, to organize a society.

The object is to secure by co-operation and meetings for discussion, the best courses of study, methods of instruction, equipment, buildings, and in general the maximum efficiency (without excluding other colleges) of the mechanical engineering department of *all* colleges which owe their existence in whole or in part to the "Act of Congress of July, 1862, known as an act donating public lands to the several States and territories."

The following gentlemen have been selected as a committee on arrangements: S. W. Robinson, Columbus, Ohio; C. W. Scribner, Ames, Iowa; O. P. Hood, Manhattan, Kansas.

To all interested a most cordial invitation is extended to take part in a movement which has for its foundation stone the welfare of the entire country.

A. J. WIECHARDT,
Acting Secretary,
Box 106, Ames, Iowa.

## Served Exactly Right.

The *Evening Journal*, Jersey City, has the following:

"We noted, a few days ago, an instance of the shortsightedness of that greed which prompts owners of land and building lots in this city to demand exorbitant prices for building locations, especially for new business enterprises. A company with a large capital proposed to establish here a new manufacturing business that would have given employment to many hands, brought new residents to this city, furnished tenants to landlords and customers to our local dealers. The company's agent found a desirable site in this city for the location of his factory, but the moment it was known that he wanted a large plot of land, the price of the lots was shoved up to an exorbitant figure, and the agent, in disgust, went over to Long Island, where he could buy a factory site at a reasonable price, and the land owners here sold nothing. If they had been reasonable, or sagacious, they could have made sales of lots at fair prices, and the business would have been established here. 'What fools these mortals be,' and how greed overreaches itself."

## Report of the Committee N. A. S. E. on Amalgamation.

The following report will explain itself:

MR. J. J. ILLINGWORTH, Pres. N. A. S. E.,
Utica, N. Y.

DEAR SIR AND BROTHER:

At the New York Convention of the National Association of Stationary Engineers, a resolution was adopted that the National president appoint a committee to take into consideration the feasibility of the amalgamation of the National Association of Stationary Engineers with the Canadian Association of Stationary Engineers.

Your committee respectfully beg leave to report: That the undersigned, appointed by you to represent the National Association of Stationary Engineers, and a committee of three appointed by the executive head to represent the Canadian Association of Stationary Engineers, met in the city of Buffalo, N. Y., on February 28th, 1891. The question of amalgamation was fully discussed in all its bearings, and from the tenor of discussion it was evident that all of the members of both committees were favorable to the amalgamation, and the following resolutions were unanimously adopted:

*Resolved*, That this committee recommend to the next convention of the National Association of Stationary Engineers, to meet at Omaha, Neb., on the first Tuesday of September, 1891, that the Canadian Association of Stationary Engineers be admitted to full membership in the National Association of Stationary Engineers, with all of the rights and benefits of the same, they—the Canadian Association of Stationary Engineers—complying with the constitution of the National Association of Stationary Engineers, and with the laws of the United States while living therein. It was also

*Resolved*, That the committee recommend to the next convention of the National Association of Stationary Engineers, through the National president, that the name of the National Association of Stationary Engineers be changed to the International Association of Steam and Electrical Engineers.

Respectfully submitted,
FREDERICK KEPPY,
J. T. MONK,
THOMAS F. MCKEOUGH,
Committee on Amalgamation.

The Pennsylvania Railroad Company has elevated its tracks through Jersey City, which is a matter of convenience to the citizens, and will probably result in the saving of just about one life a day—perhaps more than that. But with a shrewdness born of long experience, while the company has taken up its tracks elsewhere through the city, it has left them down at the street crossings, and street car passengers enjoy the exhilaration of being jolted over them, just as usual. It is thought that the objective point in doing this is the retaining of the right of way. Of course, if the city authorities had just a little nerve, these rails at the crossings would come up without burdensome waste of time, but the railroads, to all intents and purposes, own the city and the rails, and—if they carry that with them—the right of way is likely to remain.

A western manufacturer, whose manufactures are covered by several patents, expressed himself recently to the writer to the effect that he had never really invented anything; that he had simply combined things to his purpose, and nothing more. All of this shows a misunderstanding of what is really meant by the expression "to invent." No one can invent the sunshine, but it is possible for any one to invent uses for the sunshine, and to obtain a patent on so doing. Then he will hear a lot of criticism because the sun shone before he was born.

The Pennsylvania Railroad has built a depot, in every way creditable, at its terminal station in Jersey City. But it ought to have been saved from the description of this depot as given by the *The Press*. Listen:

Not an inch of wood has been employed in its construction, and this alone is a wonderful achievement to those well versed in the science of the erection of railroad spans and sheds.

Wonderful, to be sure.

Then this astute writer makes the astonishing discovery that for holding the parts of a structure of this kind together rivets "are stronger and even better than bolts."

## LETTERS FROM PRACTICAL MEN.

### Machinists and Specialists.

*Editor American Machinist:*

There are some things in Mr. Rogers' article in the issue of May 14th which I would heartily indorse, others to which I would decidedly object.

I think that Mr. Rogers takes a great deal upon himself when he guarantees that his new cub, after running a planer five months, will be capable of doing "as skillful work as can be done by any one." He may be able to work to as fine a line, or take as heavy a cut as any man in Mr. Rogers' shop. But I have found in my short experience, that a first-class planer is required to do considerably more than that. I know that in some shops it is a common thing to take an intelligent laborer and teach him how to bore and turn pulleys; another is taught how to cut threads on a lathe which is used for that purpose only. These men, however, are not lathe experts. I should say that they were expert in boring and turning pulleys, or expert in cutting threads. They are specialists, in the sense that the man who sweeps the shop floor is a specialist.

It would be very unjust to say that our cubs are slow; they are as bright a lot of fellows as you can find in any machine shop. Neither are our planers "terribly complicated," as Mr. Rogers suggests.

It seems to me that Mr. Rogers thinks that the most difficult thing connected with machine work is managing the machine itself.

I have not found it so.

Any one can learn to manage our planers and do a simple job, as working to a line, etc., in a few months. But there are many other things which he cannot do until he has had a little more experience. I finished my apprenticeship about a year ago, and am earning almost three times as much as the "sex monts" man. Now, while I consider the firm that I work for as liberal in their treatment of their employes as any firm that I know of, they run their establishment to make dollars and cents, and I firmly believe that if they could get a man to do the work on the planing machine that I am now doing, for one-third the money which they pay me, they would not hesitate a moment in telling me that they have no further need of my services.

As for the man who builds a machine, and yet cannot run it, I can say that I have found many of them who have built lathes and planers complete, and yet they cannot do the work required on those machines.

CHARLES STELZLE.

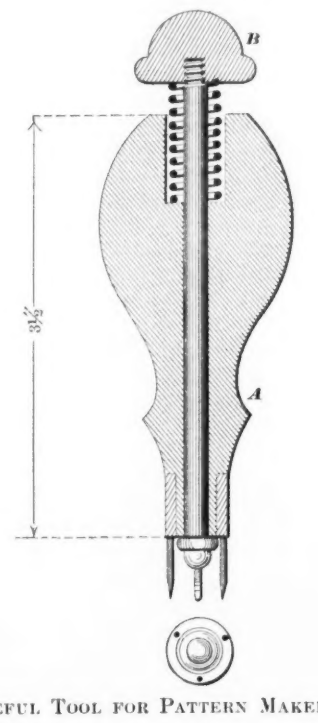
### A Useful Tool for Pattern Makers.

*Editor American Machinist:*

Every pattern maker on small work knows the difficulty of shellacing a pattern entirely over without daubing the fingers, and even when the usual method of holding the work upon the point of a knife blade is resorted to, still the inconvenience attending the operation is not overcome, for as the brush reaches that part of the pattern most distant from the point of support, it is pretty apt to cause the work to loosen its hold, and very likely drop on the floor.

Now in this letter I shall endeavor to explain a simple device which is not patented, and which any pattern maker can make for himself with perhaps a little aid from some good friend in the machine shop. This tool not only holds the pattern securely while being varnished, but also releases the work instantly when the operation is completed, without touching it at all with the hands. A glance at the cut will explain the *modus operandi*. First, turn the handle as shown at *A* about $3\frac{1}{2}''$ in length, and having a very thick ferrule on the end. (A ring cut from the end of a piece of gas-pipe makes an excellent ferrule.) Next bore a small hole about $\frac{5}{16}''$ diameter through its entire length, having the upper end counterbored $\frac{1}{4}''$ in diameter and about $\frac{3}{4}''$ deep. Now on the end of the ferrule drill three small holes equidistant from each other, and insert some steel wire prongs.

For the plunger to release the work I used a little brass rod having an acorn-shaped tip, such as ladies use for banner rods, and small curtains. This form of tip is excellent, for




USEFUL TOOL FOR PATTERN MAKERS.

it will not scratch the work. Cut a thread on the top end of the plunger rod, and screw it into the cap, as shown at *B*. Have the rod long enough so that the spiral spring will keep the cap pressed back $\frac{1}{4}''$ from the main body of the handle. It is a good plan to turn a little groove on the under side of the cap just the diameter of the spring, so as to hold it in position. The prongs should be about $\frac{1}{4}''$ longer than the plunger tip, and filed back for $\frac{1}{8}''$ or more to sharp *flat* points. (I use the word *flat* in the sense of *thin-edged*.) This form is much better than round points, for the marks left will be scarcely perceptible. To use this tool to the best advantage, hold it in the left hand and strike the work firmly and squarely with the three prongs, and after the pattern is varnished simply press the cap *B* with the thumb; this will cause the plunger to press the pattern in a point exactly equidistant between the three points, and release it at once without injury. This tool is something I had never seen, but had felt the need of, and so I made one for myself, and it works perfectly. If any brother pattern maker can make use of the idea he is welcome, and has my best wishes for success.

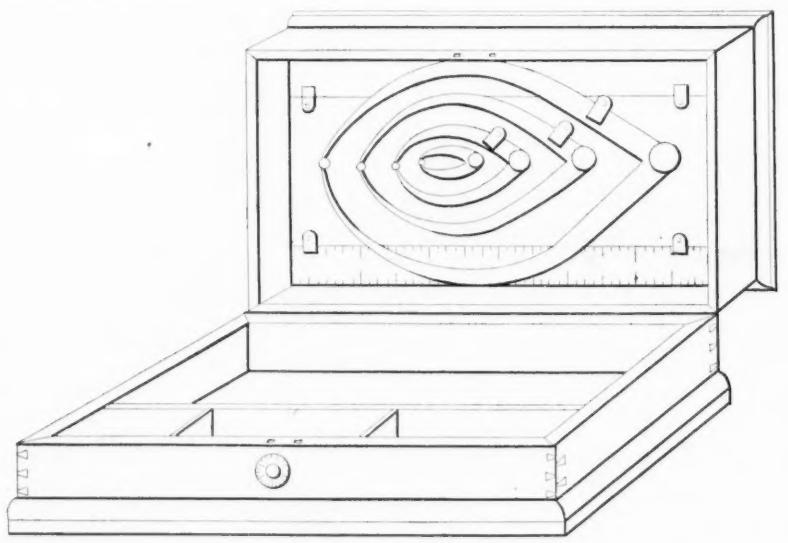
JOHN M. RICHARDSON.

### A Convenient Tool Chest.

*Editor American Machinist:*

I herewith send you sketch and dimensions of a convenient tool chest for machinists. It has sufficient capacity for a number of tools. The leading features are, being shallow, the tools are always in sight, avoiding the trouble of digging into a deep box. The lid, which is recessed 2″ deep, allows room for a nest of calipers, 24 scale, and straight-edge, and does not crush anything, as is the case with flat lids. Being flat, it can be carried by a shawl or sample strap, *à la* gripsack, during the migrations of the owner.

LEE C. SHARP.



A CONVENIENT TOOL CHEST.

### About Lathes—An Indicator.

*Editor American Machinist:*

I would like to explain the position I took in your issue of Oct. 30th, 1890, in regard to the lines for setting a lathe straight.

Bell Crank, in a later issue, says that all these lines, good, bad and indifferent, do not hinder a good man in doing good work. I agree with him in this. A good man can do good work anyway, provided he is given a chance to do as well as he can. If he has not got a lathe he can make one, but this might not be very convenient, though, nor is it very convenient to go through the original process of "lining up" every time we use a lathe. I believe the first man who drew a line for setting a head-stock or tail-stock in line, knew what he was doing, and that he was not a fool.

I believe that the idea is all right, but that it has been much abused. In the issue of Oct. 30th, I spoke about having trouble with all these lines. I did not mean that I could not get the old lathe in line, but trouble in the way of convenience. I said in that paper that this lathe was big and clumsy. It was old, and had been badly used and worked hard. Perhaps Bell Crank would spend half a day lining it up every time he used it, but I would not if I could help it. This was a job shop, and every job was a "hurry job." This lathe was everybody's lathe. I think most people are pretty well acquainted with everybody's way of doing business. The lathe was used mostly on short jobs. No workman felt it his duty to make a thorough job of "lining up," and establish correct straight line marks. I tried this one time. I lined up the spindle, and filed a flat place so that when the head was in line the two surfaces would be flush, but the next time I used this lathe, which was about a month afterward, I found that my flat place had been filed, I can't say how many times, since I left there.

Most of the workmen in this shop were good for the work there. The trouble was they did not know that anybody had gone to the trouble of lining up the lathe right, but supposed the flat place I filed there was like the scratches, only makeshifts, and was subject to great improvements.

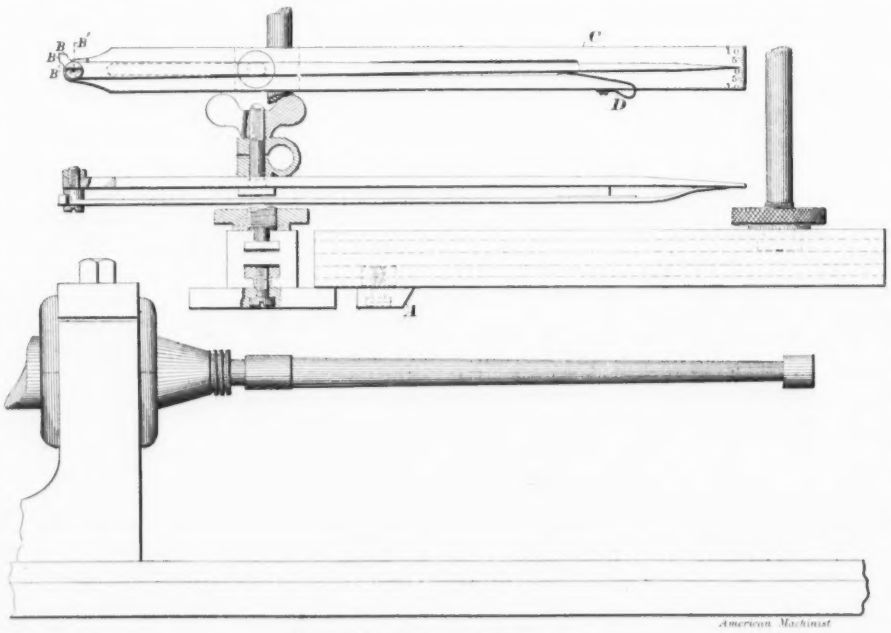
Bell Crank expresses his contempt for a man who lines up a lathe by boring a hole with a long boring tool, but I think when he takes into consideration that it was that hole that he wanted to get straight, and he did not care if the spindle was not in line, if he could get the hole straight easier by having it out of line, that he will see the matter in a different light.

I do not mean to say that it was just the proper thing to draw a line for that position, but no doubt this line was as near correct as any other there, and it certainly did help this man when doing a job there again, for he would remember the conditions under which he made it.

There is always a large amount of guessing going on in such a shop, and with such tools. It makes a great deal of difference, though, who it is who does the guessing. These men would do good work and quick, and any kind of work, from a sewing machine to a locomotive or steamboat. They would work with judgment and without drawings, and bring their work out satisfactory. If Bell Crank could send these men to work with a shovel, and all others like them, machine shops would be very hard up for good men. Perhaps Bell Crank could go in this shop, and do their work a great deal quicker and better than they can, but he would have to do well if he did.

The real trouble is just here. It should not be everybody's business to establish straight line marks on lathes.

I once heard a story that illustrates everybody's way of doing things first rate. A man was making a canoe, or what is commonly called a "dug-out" (dug out of a log). He had his log close to the road where many people were constantly passing. Most every one who passed had some suggestion to offer about how he or she thought some part should be shaped. He adopted every suggestion, and the result was that the shape of the outside did not agree with the shape of the inside. In many places it was cut clear through. He concluded that, although it might be good for a sieve, it was not good for a boat, so rolled it on one side and started another. Very soon another man came along with a new idea. He got mad, and pointing to the canoe he had spoiled said, "There is everybody's canoe, you can work on that all you like, make all the changes you see fit to. I am making this one myself." It should have been the foreman's duty to see that correct straight line




ABOUT LATHES—AN INDICATOR.

marks were made. If he had given such a job to most any of these workmen, with the understanding that they were to take the necessary time and do it right, I believe it would have been done. Then it should be understood that no new line is to be made till this one is found to be incorrect.

With fine lines on a polished surface, a good machinist can set a head or tail-stock quite close. I think I can find plenty of machinists who can match lines as near as any astronomer (with the same facilities), regardless of the salary either of them get.

We often match lines on a vernier caliper considerably inside of .001". Can we not do as well on the lathe?

A lathe that I use a great deal now has a line on the tail-stock that I know to be correct enough for most practical uses. I go by this line usually, and feel safe. It is a convenience, and worth having there.

I think most machinists will agree with me that this is good advice, but that in most cases it would not be done.

In the past, head-stocks of swivel-head lathes and tail-stocks of all have been ornamented in strange ways, and I suppose in many shops in the future they will keep right on in the same way.

One first rate way of preventing "monkeying" about a machine is to provide few "monkeying" places.

I think a head-stock cast on the bed *would be* (not *can be*) kept in line better than a swivel head.

I also think that with a taper attachment and compound rest (both of which I think have come to stay) there is no need of a swivel head. It might be desirable to make a special machine with a swivel head, but for a regular lathe I think it is needless. With a taper attachment it would not be necessary to have the tail-stock set over at all, only for errors caused by wear, or for squaring up "dishing." Of course we could square up "dishing" by using the compound rest, but this might not be so convenient as the lower slide where we can use the cross-feed.

For "lining up" the live spindle, the most practical way I know of for most places (for it requires no special rigging) is to turn two spots on a piece of cast-iron (held in a chuck, or bolted to the face plate) as far apart as is practical, without moving the tool.

The difference in sizes is the amount that the spindle is out, in twice the length of the piece turned.

This is for horizontal alignment; for vertical, make the tool cut on top, or turn the two places the same size, and only use the tool to indicate. This is a way that I have seen good machine tool builders use for a final proof, and I have never heard anybody say anything against it.

In the AMERICAN MACHINIST of May 12th, 1888, Mr. Usher gives a good plan for lining a spindle. It is to use two trams of different lengths bolted to the face plate, and made to indicate around the tail center at two positions of the tail-stock. In your issue of April 23d, Mr. Bush gives a plan for squaring the spindle with the cross-slide. As in very few lathes the cross-slide is perfectly square with ways, and many old ones are very far from it, I do not think this plan will work in all cases to make a lathe bore straight. The lathe I use now will square up first-rate, but it will not bore within a "row of trees." The plan Mr. Bush speaks of for setting the tail-stock so as to turn straight on centers, is the best one I know of, and it is one that I mentioned, in connection with a scheme for setting a lathe for turning tapers, in the AMERICAN MACHINIST of Oct. 9th issue.

I show an indicator that would be useful in any machine shop, as it not only shows an error, but also shows about how much. By the use of this indicator, and the T piece on base shown at *A* to bear against side of ways, and the test arbor, as is shown, I think a lathe can be put in line better than in any other way.

The two contact points shown at *B B* on the indicator lever, are not just correct to register in equal divisions at the back end. The contact point should come at *B' B'*, but this would not admit of one lever answering two purposes, and it could not be made that way without more parts. If proportioned right, it does a first-rate job as it is shown. There should be a screw hole at *C*, so as to allow the spring *D* to be fastened to the other side of bar, when the bar is turned over so as to get at the top side of work. In many places this will do the work of a surface gauge in a much more satisfactory way.

It is handy for truing work in the lathe, for straightening hardened work that is to be ground; for it can be used upon the ways of lathes without using the carriage, and it will not only show where the bends are, but how much, and show when the work is near enough to grind out.

Of course the test arbor will "run out" on the extreme end. I never saw one that would not a little, but this can be easily divided with the indicator, or the high side can be turned up so it would not interfere much with the horizontal alignment.

A MECHANIC.

### Wants Information.

*Editor American Machinist:*

My friend Gilkerson makes the following statement in the May 28th number, to which I wish to agree and disagree with him:

"Early associates and locality have much to do in shaping the career of the young. A child brought up in a place like Hartford or Worcester has a much better start in machinistry than one brought up in the pork-packing district of Cincinnati or Chicago, and I think that you will find that the percentage of machinists largely comes from down east."

The first sentence I agree with. The second one should read thus: "A child brought up in Worcester, Providence and Hartford has a much better chance of becoming a specialist or machine runner than one brought up anywhere else in this country." Some of the best working machinists who have made bright records as mechanics and engineers have been born and bred in the "pork packing districts" of Cincinnati and Chicago, while the chaps who went there from Worcester, Hartford, Baffins Bay, Cape Cod and other classical places haven't done anything but depend on their friends and barely live.

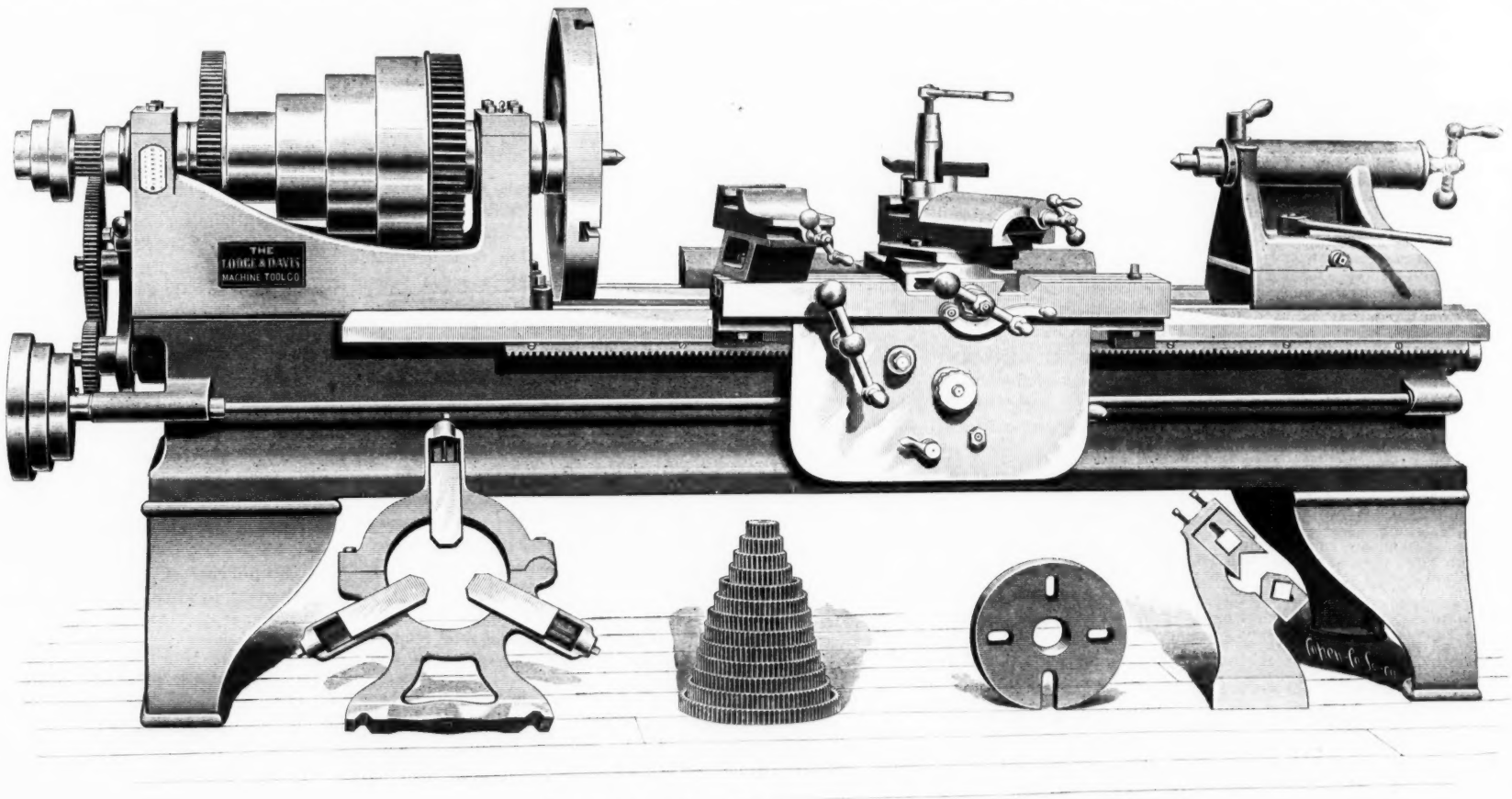
Using the term machinist in its broadest sense, the "down east" percentage is a very small part, and he finds his equals in all parts of our country, and so numerous as to excite his surprise. I have met them in Savannah, Macon, Montgomery, New Orleans, Minneapolis, and in every State in the Union, and there is the same demand here in "down east" as elsewhere for a good machinist. Of course, Mr. G. says this is what he thinks. I state what I know from having met the mechanic both at home in his native lair, and abroad in the land.

Now, I want to ask L. D. Toliver, how he figures out that tool box he describes in May 14th issue, as having built. First he says it is 25 inches long, inside measure, and it has five pigeon-holes five inches wide. I would like to ask how thick or *how thin* he made the walls between those five holes, so as to distinguish which one was the other hole? Next he made those pigeon-holes 4 inches deep, then a row of drawers 3 inches deep, then another row 4 inches, and last he left a space of 5 inches in the bottom. $4'' + 3'' + 4'' + 5'' = 16''$, same as the inside depth of the box. Now, I want to know what keeps all the things in the pigeon-holes, and the whole lot of top row of drawers from falling down when he pulls out the two lower drawers? What material did those shelves and partitions consist of? And what kind of an air castle was it?

W. S. ROGERS.

### Twenty-four Inch Manufacturers' Lathe.

We illustrate on this page a lathe built by the Lodge & Davis Machine Tool Company, of Cincinnati, which is specially designed for the requirements of manufacturers. With this in view, the extra attachments have been left off, and the lathe adapted particularly to such work as is usually done in the modern manufacturing establishment. As will be seen, it has the compound rest, however, and there is also a rest which is designed for pulley or other work up to the full swing of the lathe over the shears. The screw is inside the bed, and as close to the tool-rest as it is possible to get it, an improved open nut being employed, which is handled by the lever seen under the cross-feed screw handle. A guard protects the screw from dirt and chips. There is an automatic cross-feed, and both feeds are reversed in the apron. The lathe is built with any desired length of bed up to twenty-four feet.




TWENTY-FOUR INCH MANUFACTURERS' LATHE.

### A Problem in Transmitting Power.

An interesting problem in transmitting power was recently solved at the mill of Geo. E. Ketcham & Co., 63d street and 11th avenue, New York, in carrying power from the main engine shaft, 7" diameter, running 80 revolutions per minute to the top of the mill, about 50 feet from the engine shaft vertically by a link belt over sprocket wheels 30" and 31" diameter, at a speed of 75 revolutions per minute, conveying about 50 horse-power to a 3" shaft above. The receiving shaft above was at a right angle to the shaft below, and also 10 feet one side from the line of draft of the link belt. The link belt was turned aside at the top by two sprocket wheels 30" diameter placed one over the other, the sprocket's axles lying at a right line with the shaft below, thus causing a quarter turn in the link chain from the engine shaft up to the turning sprocket wheels. From the top shaft is driven several elevator legs, also the power is carried some 110 feet further by a wire rope driving two hay hoists in the hay sheds. The plan was worked out by Volney W. Mason, of Providence, R. I., and is giving good satisfaction.

Recently two men were killed on the cruiser "Concord" by the bursting of a steam pipe. This may be an argument in favor of the use of some other material than copper for such pipes; copper pipes frequently fail.

AMERICAN MACHINIST

Communications relating to the reading columns should be addressed to the Editor. All other communications should be addressed:

AMERICAN MACHINIST,
96 FULTON ST., NEW YORK.

PUBLISHED WEEKLY AT
96 Fulton Street, New York.

HORACE B. MILLER, Pres't and Bus. Manager.
LYCURGUS B. MOORE, Treas. and Sec'y.

F. F. HEMENWAY, Editor and Mech. Engineer.
J. G. A. MEYER, } Associates.
FRED J. MILLER, }

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☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery, nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draftsmen, and all those specially interested in the occupations we represent, on subjects pertaining to machinery.*

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$3.00 a year in advance, postage prepaid, in the United States, Canada, and Mexico.
$4.00 a year to Other Countries, postage prepaid.

**Advertising.**

Transient, 35c. per line, each insertion.
"Business Specials," 50c. a line.

**The American News Company,**
Publishers' Agents, New York.
**The International News Company,**
BREAM'S BLDG'S, Chancery Lane, LONDON, E. C., ENG., will receive subscriptions for the AMERICAN MACHINIST, at 16/6 per annum, postage paid.

DEALERS SUPPLIED BY

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Subscriptions received in Australia by W. WILLIAMS, 17 and 21 Fink's Buildings, Melbourne,

NEW YORK, JUNE 11, 1891.

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## Trade Teaching.

Considerable of our space for some time past has been given to those who wished to discuss the correlated questions of trade teaching in schools, and that of apprenticeship. We have thought it best to allow considerable latitude in this discussion, for the reason that we thought it desirable to ascertain so far as possible the direction in which the thoughts of practical men—the men most interested in these matters—were tending.

The thing which, it seems to us, has been most clearly brought out by this discussion is that, so far as mere speculation goes in such a matter, little or nothing can be determined by it. No such industrial university as is proposed by Professor Sweet has ever been tried, and until it is tried the question of its success or failure cannot be determined. It is a matter to which Professor Sweet has devoted a great deal of thought, and no one who is at all acquainted with him will for a moment doubt but that this thought and the article which is the outcome of it were inspired by the very highest and best of motives. It has provoked criticism, which, of course, was expected, and, in fact, desired. Some of the arguments brought against it seem strong, but the question of the success or failure of such a school can only be settled by a trial, and such a trial can be made only when men having money to spare become interested in it, and therefore willing to spend their money for it.

To our mind the question is not so much whether the school plan is or is not better than the old system of apprenticeship by indenture, as what can be devised that will enable boys adapted to the machinists' and kindred trades to find opportunities for learning them systematically and thoroughly. At present the situation is simply chaotic. It is extremely difficult, if not impossible, for any one to accurately define the term machinist—define it so that no one can dispute the accuracy of the definition. And in our opinion no plan will ever be devised for acquiring the skill and training necessary to be a real machinist, that will be so good as an apprenticeship in a regular commercial machine shop. But that fact signifies little if we have lost the institution of apprenticeship, for if such a loss has occurred then the only question is of a substitute. But it is to be remembered that, no matter what may be said to the contrary, the institution of apprenticeship is not completely gone so far as it applies to the machinists' trade in this country, for there are a number of the very best shops in which apprentices are regularly employed. It is true that the system has greatly declined, but, so far as machinists' apprentices are concerned, this is due solely to changes in the methods of doing work which make apprentices unprofitable to employers, and at the same time make it difficult if not impossible for boys to get such experience and training as will make them real machinists. But this applies only in such shops as have been able to minutely subdivide and classify the work, keeping each man confined to a certain part of it. Apprentices are out of place here, but, generally speaking, real machinists are equally so. If these two facts were better understood we should be in better shape to arrive at a solution of the question.

There are many smaller shops and departments of the larger ones where boys can learn to be good machinists, and if every employer would in such shops or departments employ just as many apprentices as he could do justice to and no more, taking pains to select the best boys, and then treating them well, it would, we think, prove mutually satisfactory. A machine shop is and always will be the best place to learn the machinists' trade, but a factory is no place to learn it, even though machines are manufactured in the factory. In the tool room of a modern sewing machine factory, for instance, a boy might learn to be an excellent machinist, while in the factory itself he could not; but an important fact to be considered along with this is, that real machinists do not work in the factory save in some exceptional instances, and apprenticeship is not needed to supply workmen for it. This applies to other work in varying degrees, depending upon the extent of the application of the factory methods of manufacture. When the genuine machine shop is provided with boys having an ambition to become genuine machinists, it should be remembered that, while there should be some agreement as to terms, length of service, etc., there is little to be gained by attempting to retain a boy who really wants to leave. Boys should be selected after a preliminary trial to determine if there is a mutual desire to enter into a contract. Thus the right kind of boy can usually be selected, and things should then be so managed as to make him see that his interest lies in doing his best, and staying his term out. If this and his own sense of honor do not hold him, he is not worth holding. And in this connection it should be remembered that, with an honorable and ambitious boy, the employer's interest lies in the direction of advancing him as fast as possible, and making him a skilled mechanic as much in advance of the expiration of his term as possible. Both parties will thus get the best results from the apprenticeship.

Attempts to teach trades in factories, refusal by proprietors to teach them in machine shops, and careless selection of boys to be taught, are more than anything else responsible for the decline of the apprentice system, and it can be revived by avoiding these things. The experience of a number of the best shops in this country proves this.

But if apprenticeship is to die out the experiment of a genuine trade school should be tried, and such a trial would be interesting whether apprenticeship is to die out or not, and it would probably succeed just in proportion as it deserved to succeed.

## Railway Consolidation.

Nothing perhaps will do more to hasten the consolidation of competing lines of railway than such declarations as that recently made by Mr. C. P. Huntington, who declared his belief that he could manage all the railroads of the country as one system, make the rates 2 per cent. below those at present ruling, and make 5 per cent. dividends on all the stocks.

This declaration is not, of course, the result of egotism on the part of Mr. Huntington, but was probably made simply to show his belief regarding what would be possible, either for himself or any other of a dozen railroad men that could be named, if competition were removed. And although at first sight it may seem as though such a gigantic system could not possibly be managed by any one man, yet it is to be remembered that much of the most difficult part of the work of railway management would be removed with the removal of the rivalries and contentions of different roads, and that it is not at all improbable that the management of some of the larger systems is, under present conditions, much more difficult than would be that of the single universal system referred to. But on the other hand, there are many comforts and facilities enjoyed to-day by those who travel and ship goods, that have been the direct result of competition between different roads, and that it is safe to say would never have been introduced without it.

But aside from this, it is as certain as anything in this world well can be, that no such gigantic system as this and a free government by and for the people could exist upon the same soil. One or the other—the railroad or the people—would have to be "boss," and when it comes to a clearly defined contest, such as that would bring on, there can be but little doubt that the people would control the roads. We may deplore or rejoice at this; we may say that it would be good or bad, but that will in no wise alter the facts. When the railway systems of the country become even approximately under a single management, the people, through their representatives, will control them.

## Personal.

Mr. Barton Cruikshank, who has been with the Brady Manufacturing Co., of Brooklyn, for six years, for the last two superintendent and assistant manager, has accepted the position of assistant professor in the course of graphics at the John C. Green School of Science, Princeton College. Mr. Cruikshank's object in this is to get more time for advanced theoretical study. He is a technical graduate, and a practical mechanic as well, and a member of the American Society of Mechanical Engineers. The school is to be congratulated on securing his services. Mr. E. B. Kilbourn, for sixteen years in charge of tool work and experimental machinery at Colts Armory, takes the place vacated by Mr. Cruikshank.

If it is true, as literary men assert, that there is an especial demand for short stories—efforts at fiction—it is none the less true that there is just as great yearning after short and concise articles relating to facts. The writer who, to-day, tells in a thousand words what another requires five thousand words for is sure to be the popular one. A book of fifty pages—that covers certain matters in mechanics—is worth four times as much as one of one hundred pages that covers them equally well in other respects than its length. Four times as much doesn't express it. There is scarcely room for comparison.

A recent record of a boiler explosion in Virginia accounts for the death of five men and the wounding of eight others. It would undoubtedly be a blessing to humanity if these accounts were given a good deal more attention, until the lesson that boilers should not be irresponsibly handled was completely learned. The way the average boiler is handled in the rural districts of the country is a pretty big disgrace to the civilization of the age. Even a nitro-glycerine factory is circumscribed by legal restrictions. It was a saw-mill boiler.

The Pratt Institute, in Brooklyn, is a place where technical instruction is imparted practically free. The founder of the Institute is dead, but he has wisely made provisions for the continuance of the work in which he had so great an interest during his life.

The story that contracts have been awarded for the construction of two or more fast steamships for the Cunard line is now denied.

A so-called engineer took charge of an engine in a western town, and the result was an explosion within an hour, in which five men were killed or mortally wounded.

## Literary Notes.

We have at hand the ninth annual catalogue of Rose Polytechnic Institute, of Terre Haute, Ind. It contains an outline of the course of study, and plan of instruction.

The report of the director and treasurer of the Michigan Mining School, of Houghton, Mich., is in the form of a book of 147 pages, giving interesting information in relation to the school.

PANTOBIBLION: International Bibliographical Review of the World's Scientific Literature.

This is the title of a new monthly published at St. Petersburg, Russia, edited by A. Kersha, C. E. The purpose of this publication is to keep its readers familiar with current literature on the applied sciences generally and particularly to help those engaged in technical studies of some particular branch. To that end a list of recent publications in all languages is given. Reviews of these books will appear from time to time, written in the same language as the work under notice. We have no doubt that this magazine will be of interest and of service to students and others. D. Appleton & Co. are the New York agents.

# QUESTIONS AND ANSWERS.

*Questions of general interest relating to subjects discussed in our columns will receive attention in this department. The writer's name and address should always accompany the question. Neither correct initials nor location will be published when there is a request to that effect. If questions are enclosed with a business communication, they should be written on a separate sheet.*

(254) B. H., Buffalo, N. Y., writes: I have an idea of putting up a nickel-plating machine, but I do not know whether it will pay, as I do not know much about it. Who manufactures these machines? *A.*—I. W. Colbourn & Co., Fitchburg, Mass., build machines of this kind, and they will give you all the information in regard to them.

(255) A. I. C., Lawrence, N. Y., writes: Please tell me what is a trolley that gives name to the overhead system of electric traction. Ordinarily a trolley is a small four-wheeled car used in mining. *A.*—A trolley is a small carriage for carrying a given load. It may have one or more wheels. In the overhead system of electric traction it is a one-wheeled carriage, moving along the overhead wires.

(256) D. M. H., Wakefield, Mass., writes: I would like to ask you where I can buy a book treating on drafting, suitable for a beginner. I should like a book that will help me to draw such changes as I may want to make in machines. I have taken the AMERICAN MACHINIST for about three months. *A.*—The articles on "Practical Drawing," which were commenced in our issue of October 23, 1886, will, we believe, suit you.

(257) W. S. H., Philadelphia, Pa., writes: Some time ago, a year or so, mention was made in the editorial columns of your paper, if I remember correctly, of a dictionary of mechanical and technical terms, etc. It was, or is, being compiled by some party at or from Lehigh University, Bethlehem, Pa. Will you please give me some information concerning it? *A.*—We have not seen it, and do not know whether it has been published.

(258) E. S. M., Allegheny City, Pa., writes: I have for some time past been in search of a work on cams and cam motions. Can you refer me to one on this particular branch of machine design. I desire something that will fully describe the mode of laying out cams and peculiar motions, and also give directions that will guide me in the construction of the same. *A.*—"Mechanics of Engineering," by Dr. J. Weisbach, Volume 3, Part 1, Section 2, will help you.

(259) L. D. H., St. Johnsbury, Vt., asks: Is the tup of a trip hammer thrown higher by rebounding than the crank-pin will carry it? Does the crank-pin throw the tup down with a greater force than it will have by falling? *A.*—The tup of a trip-hammer is simply lifted by a cam on the driving shaft, and is then allowed to drop. The force of the blow is due to the fall, and very frequently aided by a spring; it is not affected by the cam. Very little or no rebounding takes place.

(260) A. R. H., Lebanon, Pa., writes: Please give me, through the AMERICAN MACHINIST, the title of a good practical book on cranes. *A.*—It is difficult to recommend a particular one of the several good books published treating on this subject, since we do not know how far you are advanced in mathematics; books that may suit us may not suit you. If there is a public library anywhere near you, we should advise you to there examine the books and make your own selection; or send to a dealer in scientific books for a catalogue. You may need more than one book.

(261) H. G. W., Clarksville, Tenn., writes: Please give in your question department the name of some good practical book on laying out and manipulating plate iron. I have several giving the geometrical part of laying out the patterns, but want something that gives practical methods of laying out the holes in irregular work, the contraction due to rolling and forming, and such practical points. *A.*—We believe that the articles on practical drawing recently published in the AMERICAN MACHINIST will give you the principles which govern the laying out of holes in irregular work. In regard to contraction due to rolling, etc., and other practical points, we believe that experience is the only reliable teacher.

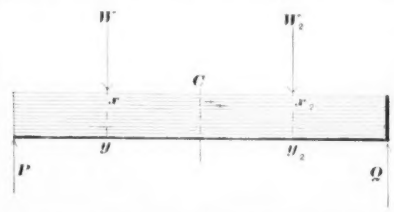
(262) X. Y., ——, writes: Please explain the process of sweating brasses together as practiced in some shops. What is the mixture used, and how is it done? *A.*—The surfaces of the castings which are to be united are first scraped or filed; they are then tinned. After this the surfaces are placed against each other, and the castings are heated until the tin melts; the surfaces are then pressed together, and thereby become united. 2. What is the practical way of lining locomotive slides? *A.*—It seems to us that the proper way of lining up slides should suggest itself to you; they have to be parallel to a line passed through the center of the cylinder, and their working faces have to be parallel to axis of the driving axles. The gauges you will require for striking the lines and the mode of procedure will depend much on the design of engine.

(263) R. A. P., Garrettsville, O., asks: Do you know of any large works anywhere near Garrettsville where they employ mechanical draftsmen, in which a person would be taken to learn the trade? *A.*—We do not. It seems to us that you should be better acquainted with the shops in your own locality than we are. 2. Is it necessary that a beginner should have a knowledge of geometry and algebra upon entering a place? *A.*—It is absolutely necessary that he should have a knowledge of geometry; and it will also be advantageous to have a knowledge of algebra. He must have a knowledge of these branches before he can become a competent draftsman. 3. What wages does a beginner receive? *A.*—That depends on the agreement made with the employer; sometimes the beginner pays for his instructions instead of receiving any wages. 4. What wages do professionals receive? *A.*—See answer to Question 110, in our issue of March 5, current volume.

(264) C. O. F., Charlestown, Mass., writes: In pumping the condensed water from the hot well in condensing engines it is usual amongst other devices to put the pump below the level of the water, so that it will run by gravity and fill the pump barrel. This is on account of the difficulty of sucking or pumping, as is ordinarily understood, of hot water, the difficulty increasing with the temperature of said water. Suppose a pump could be made to do this work in the ordinary manner, that is, pump above the water source of supply, would a pump of this kind, in your estimation, have any special market value sufficient to start making them, and have you any knowledge of such a device? *A.*—There are pumps made which will pump water of a temperature equal to that of the hot well, and which may be placed some distance above the source of supply. Whether your pump will have a special market value will depend much upon its design. We have no knowledge of other devices for raising hot water, excepting the injector.

(265) C. H. G., ——, Pa., writes: Enclosed find a card taken from one of our engines, also a sketch of valve and seat. We have twenty engines of this kind in one department; they are 12x12 inches, vertical, with two cylinders to one bed-plate. The card is taken with a No. 20 spring; the engine runs at 150 revolutions per minute. Counter pressure caused by cramped exhaust has been remedied. Each engine runs one machine, and the load does not vary three horse-power at any time. Each pair of cylinders has a throttling governor, but it does not control the engine. There is a great difference between the boiler pressure and that in the cylinder; do you think this will prevent the governor from controlling the engine? We cannot reduce the pressure in the boilers without making radical changes in our steam line and plant. What would be the best way to control the engines? Would a reducing valve on the main steam pipe to this department be practical? Can you tell me how to change the engines to an automatic cut-off, and do it cheaply? One engine would run two machines, would it not? What would be the saving of steam? *A.*—The sketch of the valve, to which our correspondent refers, shows a lap of $\frac{3}{16}$ inch; the steam ports are $\frac{5}{16}$ inch wide; exhaust port, $1\frac{1}{2}$ inch; and the bridges are about $\frac{3}{16}$ inch thick; the length of ports is not given. The boiler pressure is given at 80 pounds; and the indicator card shows a pressure of 15 pounds in the cylinder; the steam follows the piston nearly through the whole stroke. It is not stated what kind of machines the engines drive. It is plainly evident that the engines are too large for the work they have to do; each engine is certainly large enough to drive two machines instead of one, whatever that machine may be; and judging from the given data of the valve, the engines are not properly designed. The valve should have at least $\frac{1}{16}$ inch lap; in fact, it should have more, but a greater lap than $\frac{1}{16}$ inch will cramp the exhaust port. Of course, increasing the lap will require an increase of the travel of the valve, and whether the steam chest will allow this increase we do not know, as we have not sufficient data. By increasing the lap, and making the engines to do double the amount of work that they are now doing, the governor will work more satisfactory. This change will, of course, require an increase of pressure in the cylinders, which can be easily obtained if the steam pipes and the area of steam ports are correctly proportioned. Do not attempt to put in a reducing valve in the steam pipe, but engage the services of a competent mechanical engineer, who can certainly effect a great saving of fuel. To change the engines to automatic engines will depend on their design, of which you have given no data, and therefore we cannot advise you.

(266) G. E. B., Horton, Kan., writes: A bar of wrought iron 4x5 inches and 10 feet 5 inches long, is supported at each end. Two weights or forces are applied at upper edge of the bar at 3 feet 2½ inches from each end, leaving a distance of 4 feet between the forces or centers of the weights. What weight will this bar sustain, and how do you calculate it? *A.*—We shall assume that the bar is placed horizontally with the 5-inch sides vertically. The conditions of the problem are shown in the accompanying figure. The bar rests on the supports $P$ and $Q$, placed 10 feet 5 inches apart; $W$ and $W_2$ represent the given forces applied at a distance $a$, equal to 38½ inches from each support. These forces we shall assume to be equal to each other. Now leaving the weight of the bar out of consideration, then each support will have to resist a force equal to $W$ or $W_2$, because $W$ and $W_2$ are equal and placed at equal distances from the supports. These




conditions reduce our problem to a very simple one, and all we need to consider is, the weight which can be supported by the beam on one side of the center line $C$, say the left side Here the dangerous section is at $x\ y$, and for the condition of equilibrium, the moment of the internal stresses must be equal to bending moment at $x\ y$. Let $P$ represent the force in pounds resisted by the support, and let $a$ be the horizontal distance in inches from $P$ to line of direction in which $W$ acts. Then the bending moment at $x\ y$, expressed in inch-pounds, will be equal to $P \times a$. Now let $R$ represent the unit stress on the fiber most remote from the neutral surface; the safe value of $R$, for wrought iron, is usually taken at 12,000 pounds per square inch; let $b$ designate the breadth in inches of the beam (4 inches in this case); and $d$ the depth in inches (in this case 5 inches). Now for a condition of equilibrium we have

$$P \times a = \tfrac{1}{6}\ R \times b \times d^2. \qquad (1)$$

Taking 12,000 for the value of $R$ we may reduce formula to a simpler one as follows:

$$P \times a = 2{,}000 \times b \times d^2 \qquad (2)$$

consequently,

$$P = \frac{2{,}000 \times b \times d^2}{a}. \qquad (3)$$

Now substituting for the symbols in Formula (3) their values, we have

$$P = \frac{2{,}000 \times 4 \times 5^2}{38.5} = 5{,}194.8$$

pounds. But we have seen the $P = W$; therefore $W = 5{,}194.8$ pounds. The same result is obtained for $W_2$, consequently the beam will safely sustain $5{,}194.8 + 5{,}194.8 = 10{,}389.6$ pounds placed as shown in the illustration, with the weight of the beam neglected.


## BUSINESS SPECIALS

*Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue.*

George B. Grant—Gear Wheels. See p. 20.

Link-Belting and Sprocket Wheels.
Send for Catalogue of Link-Belting.
Over 50,000,000 feet of Link-Belt in use.
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Special Tools for Railway Repair Shops. Pedrick & Ayer, Philadelphia, Pa.

Light Special Machinery and Tools to order. The Meriden Machine Tool Co., Meriden, Conn.

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Miller's Falls Co., 98 Reade St., New York, are building a Power Frame for their Star Hack Saw.

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For the Latest Improved Diamond Prospecting Drill, address the M. C. Bullock Mfg. Co., 138 Jackson St., Chicago, Ill.

Send $1 for Catalogue D, Fine Tools and Supplies. Over 550 pages. Fully illust'd. Free when $10 worth goods are ordered. Frasse & Co., 92 Park Row, N. Y.

"Twenty Years With the Indicator," by Thomas Pray, Jr. 10,100 sold. Price, $2.50. Order of bookseller; take no other.

Audubon Machine Works, New Haven, Conn. Electrical work, superior facilities. Builders of machinery, heavy and light.

Guild & Garrison, Brooklyn, N. Y., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps, acid blowers, filter press pumps, etc.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocum & Son's Shafting Works, Drinker St., Philadelphia, Pa.

S. W. Card & Co., Mansfield, Mass., make everything in the line of Taps and Dies. S. A. Smith, 23 S. Canal St., Chicago, Western Agent.

Most sensitive and durable Damper Regulator made; works within one pound. Send for circular. T. Kieley, 11 W. Thirteenth St., New York.

For the latest improved Eccentric Hook, Connecting Rods and Stub Ends, address T. C. Dill Machine Company, Philadelphia, Pa.

Self-adjusting Hand-Screw for pattern makers cabinet makers and wood workers generally. Send for circular. Wm. H. Denney, Lancaster, Pa.

N. Y. City Bolt & Nut Co., Limited, 33 and 35 Desbrosses St., N. Y. City, manufacturers of Machine Bolts of every description. Write for estimates.

"Arithmetic of Electricity." A practical treatise on electrical calculations of all kinds, by simple arithmetic only. Just published. Price, $1.00. Send for descriptive circular. Our complete book catalogue mailed free to any address. Norman W. Henley & Co., 150 Nassau St., New York.

Hawkins' Calculations for Engineers and Steam Users. $2 50 postpaid. "Wish we could have had it 15 years ago."—Jos. Colgan, Cherokee, Kan. Theo. Audel & Co., 91 Liberty St., N. Y.

25" / 32" / 37" / 42" — "Only Drill Press built on 'Ko-rekt' principles, even if they come from Jersey." Gould & Eberhardt, Newark, N. J.

DuBois & DuBois, Patent Attys., 715 11th St., Washington, D. C., procure first-class patents. Send stamp for illustrated pamphlet, "March of Invention," containing valuable information, and list of references

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Foot and Power Presses for Metal, Paper and Leather. Perforating Dies a specialty. Estimates given for special machines or dies. Edwin B. Stimpson & Son, Manufacturers, 31 Spruce St., New York.

Every draftsman needs one. The Engineer's Sketch Book of mechanical movements, appliances, devices, contrivances, etc., by T. W. Barber. 1,936 illustrations, 8vo, cloth, $3. Catalogue of books on mech. subjects free. E. & F. N. Spon, 12 Cortlandt St., New York

De Lamater Screw Propeller Wheel, made only by The Samuel L. Moore & Sons Co., Elizabethport, N. J., who have purchased from C. H. De Lamater & Co., New York, all their patterns, books of record, gauges, etc Location and equipment well adapted for Heavy Steamship Repairs.

Club Rates.—If no one is getting up a club for the AMERICAN MACHINIST in your town or establishment, send for Circular of New Club Rates, and try it yourself. Address AMERICAN MACHINIST, 96 Fulton St., New York.

"Binders" for the AMERICAN MACHINIST. Two styles—the "Common Sense," as heretofore sold by us, and mailed to any address at $1.00 each, and the "New Handy," mailed at 50c. each. The former has stiff board covers, while the latter has flexible covers with full page opening flat. Either will hold the entire 52 issues of any volume. American Machinist Publishing Co., 96 Fulton St., New York.

"Indicator Practice and Steam Engine Economy." By F. F. Hemenway. Contains plain directions for using the indicator and making all required calculations from the diagram, also the principles of economy in operating steam engines and current practice in testing engines and boilers. Price, $2, postpaid. Published by John Wiley & Sons, 53 East Tenth Street, New York.


## MANUFACTURES.

There is some talk of establishing an iron foundry at Brunswick, Md.

M. Osborn is to add new machinery to his mill at Bloomingdale, Wis.

The plant of the Donaldson Iron Company, Emaus, Pa., is to be increased.

The Muskegon (Mich.) Malleable Iron Works are building a structure 220x90 feet in size.

The Carrollton (Ga.) Light and Power Co. will, it is stated, enlarge its electric light plant.

The Davis & Furber Machine Company's foundry, at North Andover, Mass., is being enlarged.

The erection of a foundry and machine shop is contemplated by Lewis Miller at Chester, Pa.

The Diamond Machine Company, of Chicago, are making extensive additions to their equipment.

Lucadoe & Hager will, it is reported, put new machinery in their iron foundry, at Glen Elk, W. Va.

It is rumored that the Tarboro Cotton Factory Co. will erect another cotton-mill at Tarboro, N. C.

An Ohio party is negotiating for the removal of his iron foundry and brass works to Gordonsville, Va.

Efforts are being made for the establishment of a knitting-mill and an iron foundry at Brunswick, Md.

The Leavitt Machine Company, Orange, Mass., is about to double its force of help and enlarge the plant.

The Reliance Machine Company, Minneapolis, Minn., has been incorporated, with a capital of $10,000.

Work will be begun on the plant of the Electric Light and Power Company, Exeter, N. H., about June 15.

It is proposed to establish a rolling-mill at Sheffield, Ala., where a number of blast furnaces have been built.

The Industrial Iron Works, at Bay City, Mich., are preparing to build an addition, 255x90 feet, to their works.

It is reported that ornamental wrought-iron works will be established at Anniston, Ala., by Mr. Harry Toole.

The Sioux City (Iowa) Engine Works are adding new special machinery, which will greatly increase their facilities.

It is stated that the Magic Iron City Works, which are located at Birmingham, Ala., are putting in new machinery.

It is announced that a steel car works plant, now located at Boston, Mass., is to be removed to Watauga, Tenn.

John Steele, J. W. Whittle and E. Taylor contemplate the erection of an electric light plant at Georgetown, Ky.

The Noyes & Nutter Manufacturing Company are erecting a new foundry building at Bangor, Me., to cost $6,000.

The facilities of the plant of the Dartmouth Manufacturing Co., of Augusta, Ga., are to be extensively increased.

The Blodgett Balance Power Engine Company has been organized, at Chicago, Ill., to make the Blodgett engines there.

It is probable that a malleable iron works, employing 600 hands, will be established at either Akron or Canton, Ohio.

The Henrietta (N. C.) Mills has decided to increase its capital stock $100,000, to purchase additional machinery for its cotton-mill.

The Salem (N. C.) Iron Works Company is contemplating the addition of an outfit for making cotton and woolen machinery.

The Casey & Hedges Manufacturing Company, of Chattanooga, Tenn., is reported as having increased the capacity of its boiler works.

An electric power plant is to be erected at Lynchburg, Va., to operate the electric railway now being constructed by the Rivermont Co.

Mr Blackburn, of Atlanta, is negotiating for the establishment in Fort Worth, Texas, of a plant for the manufacture of electric motors.

The Western Iron Company, manufacturing bar-iron, nuts, bolts, etc., at Kansas City, Mo., is to remove its plant to Kenilworth Station.

The Nims Manufacturing Company, Mt. Holly, N. C., proposes to erect a mill of about 2,000 or 2,500 spindles to manufacture cotton yarn.

The Scott Machine and Hardware Company, at Denver, Col., are enlarging premises to double former size, and will put in several new tools.

The Springfield Machine Tool Company has been incorporated, at Springfield, Ill., with a capital of $50,000, to manufacture tools, machinery, etc.

Investigations are reported in progress at Knoxville, looking to the removal of Hearth & Co.'s steel car works from Allston, Mass., to Knoxville, Tenn.

The Wytheville (Va.) Novelty Co. is being organized, and will operate a foundry and machine shop, and manufacture novelties. The capital stock is $20,000.

The Roanoke (Va.) Rolling-mill Co. will, it is stated, be reorganized with a capital stock of $160,000, and with G. B. Lessig, of Pottstown, Pa., as manager.

L. Johnson, W. P. Lee, Warren Lott and others are reported as having organized a company to establish an iron foundry and machine shops at Way Cross, Ga.

Chattanooga and Chicago parties are about to commence the erection of a large coke iron furnace near Talladega, Ala., where they possess large ore properties.

A large force of men have been put at work on the plant of the South Boston Iron Works, at Middlesborough, Ky., and the works will be pushed to completion.

The Lodge & Davis Machine Tool Company, Cincinnati, Ohio, has furnished a complete equipment of machine tools to the Lancaster (Ohio) Reform School.

C. W. Osgood & Son's new machine shop in Bellows Falls, Vt., is begun. The foundations are laid, and work on the building will begin at once. It will be 260x50.

Frank Curtin and M. D. Herbert, of Little Falls, N. Y., have formed a copartnership, and will erect a large factory in that place for the manufacture of sewing machines.

The Talladega (Ala.) Iron and Steel Co. will issue $200,000 of bonds, make extensive improvements at its iron furnace, and put it in operation under a new management.

The Havey Steel Car Company's works at Harvey, Ill., near Chicago, are now in operation, about 75 men being employed. All the buildings have not been completed, however.

The Keystone Knitting Machine Company, of Philadelphia, with a capital of $100,000, has been incorporated, in Camden, N. J., to manufacture and sell knitting machines.

The Barnett Brass Company, of Mansfield, Ohio, is to remove to Canton, Ohio, where it will consolidate with its Canton manufactory the J. H. McClain Machine Company.

The F. J. Meyers Manufacturing Company, of Covington, Ky., contemplate establishing a branch works at Chattanooga, Tenn., for the manufacture of architectural iron work.

The Norfolk & Western Railroad Co., office, Roanoke, has awarded contract for the building of its machine shops at Shenandoah, Va., to J. J. Pettyjohn. The cost will be $50,000.

The Thornburg & Schroeder Mill Supply Company, Moundsville, W. Va., will erect a plant for the manufacture of roller process flour-mill machinery, supplies, split pulleys, etc.

The Edison General Electric Company, New York, has issued a pamphlet of convenient size relating to electric coal-cutting machinery. It contains matter of general interest.

The Joseph Dixon Crucible Company, Jersey City, N. J., are finding sale for their "Graphite Grease," for use on elevator guides, and for preventing the rusting of wire cables.

Ellington & Cooper have organized the Greenville Iron Works at Greenville, N. C., with A. B. Ellington as manager, to continue the operation of their iron foundry and machine shops.

The Russell Wheel and Foundry Company, of Detroit, Mich., will build an entirely new plant, with increased capacity and better shipping facilities than offered by the present works.

A new foundry and rolling-mill is to be established by Weber Brothers, of Kansas City, at Clinton, Mo. The main building will be 60x150 feet, and the work of erection will be begun at once.

The Mason-Perkins Manufacturing Company, Bristol, N. H., has begun work on the foundation for an extension to its machine-room, and will shut down about July 1 to complete the work.

The Iron Gate Land and Improvement Co. is reported as having closed negotiations for the erection of iron piping works, and as negotiating for the erection of a steel plant at Iron Gate, Va.

The Holly Manufacturing Company, Lockport, N. Y., send us a circular relating to the performance, etc., of pumping engines built at the works, and giving a list of the engines and their location.

The Joliet (Ill.) Enterprise Co. will rebuild their extensive barb wire and wire-drawing plant, recently destroyed by fire. Three hundred men were thrown out of employment by that destruction.

The Royal Bridge and Iron Co. (Limited), Montreal, Canada, has been incorporated, with a capital stock of $20,000, to manufacture steel, iron and other bridges, and all structures of iron and steel.

The Talladega (Ala.) Iron and Steel Company will, it is reported, issue $200,000 of bonds, and will make extensive improvements at its iron furnace, which will be put in operation under a new management.

The Pennsylvania Diamond Drill and Manufacturing Company, Birdsboro, Pa., publishes a little pamphlet, "The Diamond Drill and its Work," which gives a good deal of information on this subject.

The main building of the company recently organized, with a capital of $100,000, to erect bolt and nut works at Curtis Bay, Md., will be 250x70 feet. The buildings will be of brick and corrugated iron.

The Chesapeake & Ohio road will, it is stated, erect machine shops at Clifton Forge for the manufacture of locomotives, engines and boilers, and shops for the building of freight cars, passenger coaches, etc.

The Wallace & Graves Machine and Foundry Company has filed articles of incorporation, at Lafayette, Ind. The capital stock of the company is $20,000, and it will manufacture steam boilers and castings.

The firm of Matthew Addy & Co., of Cincinnati, Ohio, have leased the Anniston Pipe Works, located at Anniston, Ala., for five years. The company will employ 500 men, and 200 tons of coke-iron will be required daily.

Immense malleable iron works are to be erected in Akron, Ohio, by capitalists of Akron and Canton. They are to be the largest of the kind in the State, and when completed will give employment to about 600 men.

The Stearns-Roger Manufacturing Company has been incorporated in Denver, Col., with a capital of $250,000, to take over the business of Stearns, Roger & Co., manufacturers of mining machinery, with works at Pueblo, Colo.

Mr. J. P. Van Wyck, with other interested parties, will erect a new paper-mill at Amsterdam, N. Y. He is the treasurer of the Van Wyck Paper Company, with mills at Philmont, N. Y. His P. O. address is Hudson, N. Y.

Clegg, Goeser & Co., engravers, Cincinnati, Ohio, have issued a specimen book of engravings that is really a work of art in its way. This firm is well known for the excellency of its work, especially work of a difficult character.

The plans for the American Manufacturing Company's new foundry and factory, to be erected at St. Paul, Minn., include a foundry 110x50 feet, one story high, costing $10,000, and a factory two stories high, 100x40 feet, to cost $20,000.

The basic steel plant, projected by T. T. Hillman and associates, to be erected at Ensley City, Ala., is meeting with substantial encouragement. The Elyton Land Company, of Birmingham, has voted a $100,000 subscription to the company's stock.

The Anniston Pipe Works, of Anniston, Ala. have been leased to a syndicate of Ohio capitalists, and will be put in operation at an early day. Their iron supply will be secured from the Woodstock Iron Co.'s coke furnaces adjacent to the pipe works

The Etna Iron Company, of Bridgeport, Ohio, intends to enlarge its mill, and put in a new battery of boilers. It is also understood that the company intends putting in new pumping machinery, having a capacity of 500,000 gallons daily.

Crook, Horner & Co., agents for the Canton (Ohio) Steam Pump Company, have secured the order to furnish the large hotel now building at Old Point Comfort with pumps. The company report a good business, especially in the South and Southeast.

The Fort Scott Foundry and Machine Works Co., Fort Scott, Kan., issue a very neat catalogue relating to machinery, used in the Swenson patent system of evaporation by multiple effects. Those interested in sugar manufacture should read the catalogue.

The American Screw Company, of Providence, R. I., is about to build a factory in Leeds, England, to be located on the banks of the Aire. It will cover an acre and a half of ground. In this factory the company will place a lot of its machinery now idle in this country.

The Exeter Machine Works, Exeter, N. H., contemplate establishing a foundry for the radiator department in the South. At the recent annual meeting of the concern, C. U. Bell was elected president, William Burlingame, treasurer, and D. U. Quimby, clerk.

The Southern Farm Tool Company have been incorporated, at Atlanta, Ga., by Thomas Lumpkin, A. M. Hipps and others. The capital stock of the company is $100,000, and the business to be carried on is the manufacture and sale of machinery and agricultural implements.

The Henderson Steel and Manufacturing Company, of Birmingham, Ala., at a recent meeting adopted a recommendation of the special committee, to make financial arrangements for the completion of its second furnace and the construction of a 300-ton blooming train.

A recently authorized corporation in Illinois is the Holmes and Pyotts Company, Chicago, to manufacture and use iron and its products for building and machinery purposes; capital stock, $300,000. The incorporators are Edward B. Holmes, James M. Pyott and David Pyott.

The Lackawanna Iron and Steel Company, at Scranton, Pa., is erecting a new pattern shop, which, it is expected, will be completed in September. It will be a brick structure, 113x53 feet, two stories high. The old pattern shop will be removed, and the machine shops extended.

The Niles Tool Works, Hamilton, Ohio, have issued an elaborate catalogue of machine tools built at the works. It is a book of 244 large pages, handsomely printed, illustrated and bound, fit for any engineer or mechanic's library. It is interesting, as showing the large line of tools built by this company.

It is stated that the La Fayette Car Works, La Fayette, Ind., have decided to remove the La Fayette branch to Lima, Ohio, where there is already a branch, and that the two works would be united under the name of the Ohio Car Manufacturing Company, and that a department for the manufacture of coaches will be added.

There is water-works agitation in Casper, Wyo.; Riverside, Ala; Valdosta, Ga.; Findlay, Ohio; Perry, Iowa; Litchfield, Ill.; Hamilton, Wash.; Pueblo, Col.; Fairmount, W. Va.; Hancock, Mich.; Lexington, Ky.; Wheeling, W. Va.; New Paltz, N. Y.; Prescott, Ont.; Friend, Neb.; Vineville, Ga.; Bellevue, Ga.; Baird, Tex.; High Point, Ga.; Bell City, Ala.

The new car shops of the Chicago, Milwaukee & St. Paul, at West Milwaukee, Wis., are about ready for operation. The latest addition consists of wood-working department 70x110 feet, and the erecting department 110x402 feet. The new addition increases the capacity of the works from four to ten box cars daily, and gives employment to 300 additional men.

The receivers of the Huntingdon (Pa.) Car Manufacturing Company having filed their final account with the court, were discharged from further duty. The works will now be operated by the Iron Car Equipment Company, of New York. The present company has a very large order for new cars, and it is expected an impetus will be given to the business of the concern.

Messrs. Morris, Williams & Bailey, Pittsburgh, Pa., manufacturers of cold-rolled steel, have begun the erection of an iron-clad building, 85x45 feet, which will about double their present capacity. New rolls, engines and the other necessary equipment, will be put in, and the present annealing furnaces enlarged to meet the increased demand. The firm has been running its works day and night since March.

The new three-story building of the Muskegon Machine and Foundry Company, at Muskegon, Mich., is nearing completion, and work is soon to begin on the foundry for gray iron castings. This building will be 200x90 feet, while the power house, work on which will begin as soon as the three 100 horse-power boilers are in place, will be 120x50 feet, two stories high.

The Pullman Palace Car Company has closed negotiations for an extensive new manufacturing site at St. Louis, Mo. This purchase covers an area about four times greater than formerly occupied by them. The price paid aggregated $137,000. It is stated that nearly 10,000 men will be employed in the new plant, which will soon be commenced and pushed to completion without delay.

The Rolled Steel Wheel Company, of Pittsburgh, Pa., propose to erect a manufacturing plant at Kensington, on the Allegheny River, near Parnassus, Pa. The concern have a capital of $600,000, and will manufacture vehicle wheels of all kinds, non-corrosive boiler tubes, and stairway and balcony railings. Ground has been broken for the plant, and the work will be rapidly pushed.

A company has been organized, at Milwaukee, Wis., to manufacture a malting machine patented by John W. Free, of New York, who is at the head of the general company controlling the patents. The company will be known as the Wisconsin Free Malting Company, and its capital stock will be fixed at $500,000 or $1,000,000. A factory will be erected for the manufacture of the machines.

C. A. Hotchkiss and Mr. Donaldson, of Cleveland, Ohio, and the South Baltimore (Md.) Car Works are to be the principal stockholders in the $100,000 stock company recently organized to erect bolt and nut works at Curtis Bay. The main building of the works will be 70x350 feet; engine and boiler-rooms of brick; the rest of the buildings of corrugated iron. Work will be commenced at once.

The Iron Cliff Iron Company and the Cleveland Iron Company, of Cleveland, Ohio, will consolidate under a West Virginia charter, and will be known as the Cleveland Cliff Iron Company. The properties of the two companies adjoin, and are located at Ishpeming, Mich. Six hundred and forty thousand tons of ore were yielded by both companies last year. The capital stock of the new company will be $5,000,000.

The Engineers' Instrument Company, 54 Warren street, New York, have issued a quite elaborate work on the Calkins steam engine indicator. We do not know whether or not this book is sold, but presume it is furnished free with the indicator. It contains a description of the Calkins indicator and other tools made by this company, instructions as to reading indicator diagrams, and tables and other matter of interest to the engineer.

The Brown & Sharpe Manufacturing Company, and Darling, Brown & Sharpe, Providence, R. I., have issued another edition of the well-known "blue-book," which is sent free upon application. It is a new edition, and contains cuts and brief descriptions of several new machines and tools brought out during the past year. This little book has come to be considered a standard publication by mechanics for the information it contains, and we have no doubt they will make their usual effort to exhaust this edition.

Palmer, Cunningham & Co., Philadelphia, Pa., are putting on the market a tool-holder that enables a man to satisfactorily hold tools for grinding, and at the same time turn the grindstone. It forms a rest for the operator, at the same time putting weight on and guiding the tool. It will hold tools square or on any angle required, and at any bevel desired. Tools are not fastened to the holder, and can be examined and placed back in same position. It can be set to move any distance across the face of stone. It holds all kinds of chisels, plain bits, beveled bits, hatchets, gouges and tools from 1½ inches to 20 inches long, and from ⅛ of an inch to 8 inches wide.

The Companhia Nacion de Foejas e Estaleiros, of Rio de Janeiro, Brazil, have placed the order for a large iron building, to be used in connection with their shipbuilding plant, with the Berlin Iron Bridge Company, of East Berlin, Conn., and the order for the machinery with J. A. Fay & Co., of Cincinnati, Ohio. The building will be entirely of iron, 165 feet wide by 300 feet long, and will be shipped by steamer from this country, the parts being carefully marked so that it can be erected in place by native workmen at Rio de Janeiro. The Berlin Iron Bridge Company are doing a large trade with the South American republics, arising from the closer commercial relations.

The following notice will explain itself: "The firm formerly engaged in the manufacture of patent portable hatchway and outrigger rope hoisting machines, elevators, dumb-waiters, friction-driven center grinders, adjustable clamping blocks, screw blocks, drill guides, etc., in the city of Philadelphia, under the name of the Energy Manufacturing Company, has sold plant, patterns, etc., necessary to the manufacture of the above-named goods, to the undersigned, who, with improved machinery and increased facilities, are prepared to furnish any of the machines made by the late concern. Correspondence solicited from parties in all parts of the world regarding these specialties. The present owners are young men with large experience in the machine business, and understand the making of these goods perfectly. They will guarantee all work to give satisfaction, and it will be their aim to improve the articles which they manufacture from time to time as is found requisite to good workmanship and perfection. Trusting to receive your patronage, we remain, very truly, ENERGY MANUFACTURING COMPANY (McCabe & O'Neill)."

Porters on the Pullman cars are very frequently required to double their routes, that is, to do just double work. For example, a porter who makes the run from New York to St. Louis is supposed to have thirty-six hours off at one end or the other of the route, which means that he shall work just about one-half the time. But when travel is heavy these porters are deprived of their lay-off, not once in a while, but regularly, and for this extra service they receive nothing. A porter explained this to the writer by saying that the Pullman Company expected its porters to make their money from travelers, which is about the size of it. But how about the service to passengers from men who have no sleep except what they steal from their duties?

## Specialists—Pumping Hot Water.

BY W. H. BOOTH.

In all professions and trades there are certain men who develop into specialists. Among the medical men I believe it is usually understood that a specialist on any subject is a man who will charge heavy fees for the privilege of acquiring special knowledge by experimenting on those who pay the fees. In engineering there is every day a greater tendency towards specialization, the result of which, no doubt, is the production of good work at cheap rates, though the effect on men is by no means good.

We find special tools and men whose business it is to attend just to such special tools, and in higher grades we still find men who devote themselves to one branch, such as gas engineers, water engineers, tool makers. Specialists, when they become so early in life, before they have had much opportunity of gaining a wider general experience, are usually rather narrow-minded, and occasionally a bit of a nuisance, for they will take narrow views of things, and are apt to look upon everything as a means to the furtherance of their special line of research or work.

As one illustration, it will, perhaps, have been noted by some who have had anything to do with earth-boring for minerals, or for water, that a consulting geologist, though quite agreeable that the special object sought should be encountered, is yet very willing that boring should proceed indefinitely, as the geological results, which to him are of interest, will be valuable.

They remind one of the collier's boy in Staffordshire, who was with his father training up a pup. Colliers are notable dog fanciers. One day the pup—of the bull variety—fastened on the old man's nose, and hung there.

"Let him hold, father; let him hang as long as he will; don't shake him off!" shouted the boy. "It'll be th' makin' o' th' pup."

So it is with specialists. They have a pup to train, no matter who pays, through the nose, for it.

I question if there are many men in any line of life who are contented to remain as they are, or would be contented if they felt that they were absolutely bound to stay on, and however desirable it may be to encourage good workmanship, I, for one, should much regret to see such an end secured by a retrograde step.

If there really has been a falling away in manual skill, does it not seem more than likely that the falling off is the direct result of the attempt to reduce man to an unthinking machine minder? A good workman must think, and if anything be given him to do which he perceives to be wrong in any point of work or principle, he will fail to do such work up to his usual standard of excellence, or will contrive some way of doing it differently, rather than go against his convictions.

So far, there is probably as little cause in America as elsewhere to complain of falling off in skill, or rather in workmanship, as judged by final results. As pointed out in your leader of April 9th, the excellence of the new American cruisers has been much commented on, and as blood is still thicker than water, there is a pretty strong opinion here that it would not pay in the long run for a certain nation to try any tricks in the line of injuring unprotected American cities.

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The annexed table may be handy when having to deal with the pumping of hot water. It gives the maximum theoretical suction, or height of lift, of a pump with hot water at various temperatures, corresponding to absolute pressures, from one pound per square inch upwards:

| Pressure per square inch. | Temperature. | Suction, height feet. |
|---|---|---|
| 1 pound. | 102.1° | 31 6 |
| 2 " | 126.3° | 29.3 |
| 3 " | 141 6° | 27.0 |
| 4 " | 153.1° | 24.7 |
| 5 " | 162.3° | 22 4 |
| 6 " | 170.2° | 20 1 |
| 7 " | 176.9° | 17 8 |
| 8 " | 182.9° | 15 5 |
| 9 " | 188.3° | 13 2 |
| 10 " | 193.3° | 10 8 |
| 11 " | 197.8° | 8.5 |
| 12 " | 202 0° | 6.2 |
| 13 " | 205.9° | 3 9 |
| 14 " | 209.6° | 1.6 |
| 14.7 " | 212.0° | 0 |

I do not know from any experiments made whether a pump which will raise within 4 feet of the theoretical height with cold water will also work to within 4 feet of theory with hot water, or whether the height pumped with both hot and cold water can be expressed as a fraction of the theoretical height.

If the former, then it would be practically impossible to lift any water hotter than 200°; but if the latter, it might be possible to raise nearly boiling water a foot or two. Still, where hot water must be pumped, it is best to let it flow to the pump under gravity.

---

Two companies are in the field for the purpose of bridging the Hudson River between the New York and New Jersey shores. Recently efforts looking to a consolidation of these companies have been made, which it is thought will be successful, in which case it is believed that funds for the enterprise will be forthcoming.

---

A few days ago a derrick used in sewer construction, in New York, fell, killing one man, and severely injuring another. A casual look at the staying of derricks used in construction of this kind is likely to lead to the belief that they are very frequently not as safe as they should be.

---

That ancient and many times worn out plan of braking a railroad train by dragging a shoe on the rail is coming to the front again. It ought to have died a natural death years since, but it never will. The man whose ideas of friction never get beyond the effect of sliding can be depended upon to resuscitate it about every ten years, or oftener.

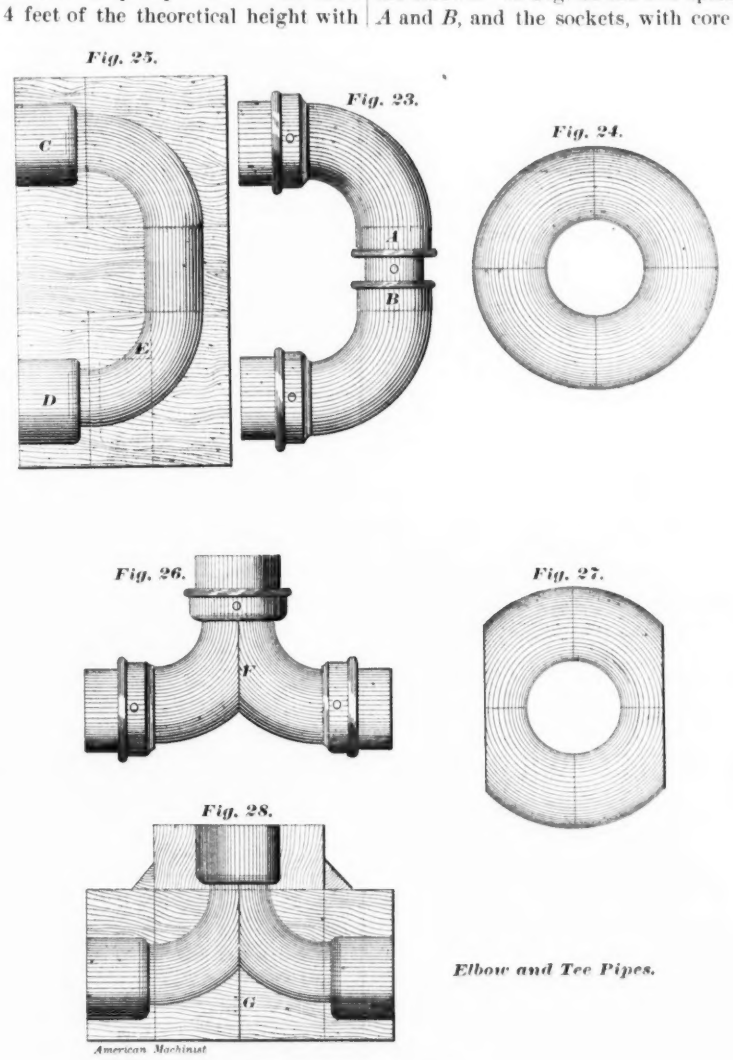
---

## Pattern Making—Elbow and Tee Pipes.

BY P. S. DINGEY.

Making patterns for elbow and tee pipes if made the right way is comparatively simple, because nearly all the work can be done in the lathe. For turning out a large number of castings the elbow pattern should be constructed as shown in Fig. 23, so that two elbows can be molded together. A ring is turned like Fig. 24, the section of it being a half circle the same size as the pipe; this circle is cut in quarters as shown, and the four pieces used to make quarter turns for the elbows. In Fig. 23 the two spicket ends *A* and *B*, and the sockets, with core prints, are turned on one stick and cut off; the stick should be sawed out long enough to permit of tongues being turned on *A* and *B*, and the sockets for fastening them to the elbows; dowel pins should be arranged to come one in each socket, and in the print between *A* and *B*, as marked. Fig. 25 represents the core-box, and, like the pattern, most of the work can be done in the lathe, and the parts joined together, as shown—a piece screwed on the back will hold the parts together. The core is generally made in halves, so that a full box will not be needed, and therefore only two quarters are used for the turns. In some cases these two quarters that are left may be used to turn the socket ends *C* and *D*. The dotted lines show that in this case the pieces left over cannot be used without cutting out the corner *E* and inserting a piece; in a small elbow it would not be worth while to do this, but for a larger pattern it would probably pay.

Figs. 26, 27 and 28 show the manner of making a pattern for a tee pipe, and will need but little explanation, as it is made much in the same way as the elbow—all the parts being turned and fitted together. In addition to being quartered, the sides of the ring in Fig. 27 are cut off, and the parts joined together at *F*, Fig. 26. The parts for the core-box are also cut this way. Before gluing the joint *F* together it should be "sized" with glue, after which the joint will be very strong when put together; the socket will also help to hold the pattern together at this point. This form of tee is to be preferred to the right angle ones, because of its extra strength and the gradual merging of the passages into each other, which renders the flow of water, etc., easy.




*Elbow and Tee Pipes.*

ELBOWS AND TEE PIPES.

---

An innocent looking railroad now being constructed, that will connect New York City with the western part of the Adirondack Mountains, will do something more—it will connect the Canadian Pacific with New York, and neither road, according to the schemer, will be troubled with the interstate commerce regulations, the Canadian road being outside the jurisdiction of Congress, and the Adirondacks and St. Lawrence wholly within the State of New York.

If, however, the new combination should need regulating, Congress will have no difficulty in finding a way clear.—*Philadelphia Record.*

---

Every once in a while there is a remarkable story published regarding the sudden starting of some old clock that has been idle for a good many years. To properly round out the sense of the supernatural, it is quite essential that some one, somewhere, shall die about this time, which is generally the case. We have never known of one of these mysterious clocks being submitted to a rigid mechanical examination for the purpose of determining just how far natural causes led to the observed results. Doing so would probably spoil a story in most cases.

---

Not long since, the writer asked a well-known mechanical engineer his opinion of a brand of steel now considerably used. His answer was one likely to induce thought as to the steady improvements in steel making. It was to the effect that he did not know anything about steel at the present time; he had had no occasion to give attention to the subject for ten years.

---

It has been proposed to produce rainfall by the explosion of dynamite in the air. It is said that, in order to test this, the government will soon make a series of experiments. We fear that in the end nature will be found ahead. Still the experiments will be full of interest.

---

Air plays an important part as a preservative of timber, and its exclusion will cause decay of the timber. Floor beams which are surrounded by cement or some other kind of composition will rot, and lead to serious accidents.

---

## Machinists' Supplies and Iron.

NEW YORK, June 6, 1891.

Iron—American Pig—The market is somewhat more active than last week, and prices are firmly maintained.

We quote: No. 1 Foundry, Standard Northern brands, $17 to $18; No. 2 is selling at $16 to $17, and Gray Forge at $14 to $14.50. Southern brands of good quality are obtainable at $16 to $17.50 for No. 1 Foundry; and $15.75 to $16 for No. 2; and $14 to $14.50 for No. 3.

Scotch Pig—We quote at $24.50 for Coltness; $22 for Dalmellington; and $20.50 for Eglington.

Copper—Very little new business has been done, mainly for the reason that the views of buyers and those of holders differ widely. Values are at 13c. to 13¼c. for Lake.

Lead—The stocks on hand are light, and prices are steadily maintained. Values are at 4.35c. to 4.45c.

Spelter—The demand is very light, yet holders seem inclined to advance prices. Values are at 4¾c. to 5c.

Tin—The market is stronger, considerable business having been done. Values for prompt shipments are 20.30c. to 20.40c.

Antimony—The market is easy and prices are unchanged.

We quote Hallett's at 15c. to 15¼c.; Cookson's, 16c. to 16¼c.; and 15c. for X. L.

Lard Oil—The market is steady at 53c. to 54c. for Prime City, according to holder and quantity. Western on spot is quoted at 52c.

---


## ✻WANTED✻

*"Situation and Help" Advertisements only inserted under this head. Rate 30 cents a line for each insertion. About seven words make a line. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue.*

Wanted—Agents in every shop for fine tools; big inducements. Address E. G. Smith, Columbia, Pa.

A skillful mechanical draftsman and designer desires engagement. Address BOX 87, AM. MACHINIST.

Wanted—Position by mech. draftsman, with prac. shop experience and references. BOX 99, AM. MACH.

Wanted—Several first-class pattern makers. Address "E.," care of AMERICAN MACHINIST.

Wanted—A good draftsman by a manufacturing company in railway line; an excellent position for the right man. Address Car Co., AM. MACHINIST.

Wanted—Position as foreman in marine or stationary machine shop, by exp. man. Address MacCorgurdale, Eagle Iron Works, Detroit, Mich.

Wanted—An experienced draftsman, well acquainted with engines and air compressor work. Address BOX 97, AMERICAN MACHINIST.

Wanted—Situation in New York City by a machinist and tool maker, age 25; 5 years' exp; model mach. preferred, or small work. D. H., AM. MACH.

A steady, sober pattern maker, of about 12 years' experience in engine and machine work, desires position of some responsibility. M. E., AM. MACH.

Wanted—A first-class mechanical draftsman who has had some prac. exp. in fitting and pattern making. A good opening with old-established engineering firm. Address P. O. Box 55, Aspen, Colo.

Tool maker wanted, on light work, to go south; must take some money interest in the business if found satisfactory. Address Post Office Box 170, Baltimore, Md.

Wanted—Position with steam engine company, with an opportunity to introduce a shaft governor which can be made for less than a throttling governor. Address GOVERNOR, AMERICAN MACHINIST.

Wanted—Experienced foreman for a machine shop, working about 15 hands, on new and repair work & gen. jobbing; state age, exp., ref., & wages expected. Beall Machine Shop, Cumberland, Md.

Situation wanted by a practical foundry foreman; a sober and steady man, and familiar with engine and jobbing work; 10 years' experience as foreman. Address Foreman, AMERICAN MACHINIST.

Wanted—By a practical machinist, who has patented and built several useful machines now in the market, a position to work out ideas, or design machines for certain purposes; makes his own drawings. Address P. A. M., AMERICAN MACHINIST.

Wanted—At Pittsburgh Locomotive Works, Pittsburgh, Pa., a competent foundryman to take charge of iron and brass foundries; must be active, entirely temperate, and thoroughly understand locomotive work; state salary expected, and give references.

Wanted—Position as supt. or foreman, by a young man, 36, successful in the systematic manufacture of machinery and mechanical devices, and in the economical management of men; a designer and draftsman of automatic and interchangeable machinery, tools, jigs, etc. W. H. S., Box 197, Burnside, Conn.

The superintendent of a manufacturing concern, who has brought them from a state of chaos to prosperity, has become dissatisfied, and invites propositions for his services; is skilled in the manufacture of medium weight and small work on the interchangeable system, and knows how to run a shop. Address Profits, AMERICAN MACHINIST.

## ✢ MISCELLANEOUS WANTS ✢

*Advertisements will be inserted under this head at 35 cents per line, each insertion.*

Cheap 2d hd-lathes & planers. S. M. York, Clev'd, O.

Bowsher's Balancing Ways. See adv., page 17.

Just out: aluminum steel hack-saws, hard but not brittle. Crescent Mfg. Co., Cleveland, Ohio.

New catalogue of engineers' specialties free. Crescent Mfg. Co., Cleveland, Ohio.

Light and fine machinery to order; Foot Lathe Catalogue for stamp. E. O. Chase, Newark, N. J.

Wanted—Customers for our new Radial Drills. C. H. Baush & Sons, Holyoke, Mass.

Wanted—Specialties to build for the Southern trade. Bluefield Iron Works, Bluefield, W. Va.

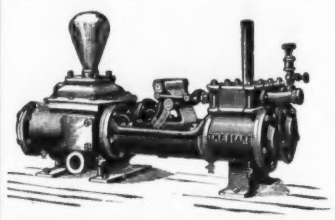
Engine for sale; 55 H. P. Watts-Campbell slide valve engine in good order; will be sold cheap. F. Berg & Co., Orange Valley, N. J.

Wanted—To send to every pattern maker, three pictures of our universal bench vise. Address J. F. Emmert & Sons, Box 313, Waynesboro, Pa.

Lathe—Powerful Lathe for sale; 36 feet long, 50 inches swing. Can be seen in operation at machine shop, 385 South Street, New York City.

For Sale—In a city of 30,000 population and five railroads, one-half interest in a good machine shop and foundry. Cause for selling, poor health. Address Shop, care AMERICAN MACHINIST.

Wanted—Engineers to write for catalogue of all the latest and most valuable mechanical, scientific and electrical books which are given free with each barrel of the Pittsburgh Boiler Scale Resolvent. Pittsburgh Boiler Scale Resolvent Co., Pittsb'gh, Pa

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STEAM PUMPS
DEANE STEAM PUMP CO.,
HOLYOKE, MASS.

CRESCENT STEEL CO.
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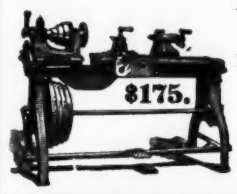
Chicago, Ills.
New York, N. Y.
MAKERS OF
FINE STEEL
For Dies, Punches, Taps, Reamers, Cold Chisels, Lathe Tools, Shear Blades, Milling Cutters, Etc., Etc.

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Drill Presses, Shapers, Band, Circular and Scroll Saws. Machinists' Tools and Supplies. Lathes on trial. Catalogue mailed on application.
THE SEBASTIAN-MAY CO.,
167 to 175 Highland Avenue, SIDNEY, OHIO.
MONTGOMERY & CO., 105 Fulton St., New York, Gen'l Agents.

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Torsional Strength equal to the best Machinery Steel.
Anti-Frictional and Non-Corrosive.
CAN BE FORGED HOT.
Round, square, and hexagon bars for pump, piston rods, bolts and screws. Yacht shafting. Rolled sheets and plates for pump linings and condenser tube sheets, &c. Spring wire.
Send for Circular.
ANSONIA BRASS & COPPER CO.,
Sole Manufacturers
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LIGHTNING AND GREEN RIVER Screw Plates.
Bolt Cutters, Hand and Power Drilling Machines, Punching Presses, Tire Benders, Tire Upsetters and Other Labor-Saving Tools. Send for Price List.
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For TOOLS, DRILLS, DIES, &C.
All Kinds in Stock.
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MANUFACTORY,
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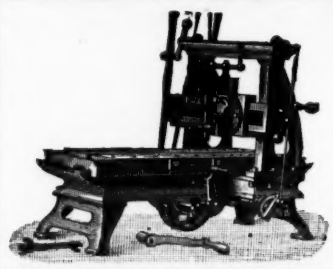

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How to get the best results with "R. MUSHET'S SPECIAL STEEL." Greatly increase your speeds and feeds then compare the work you turn off with that done by any other known Steel. This will make the first cost of "Mushet's" look insignificant.
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DYNAMOS.—One Deposition, and ten incandescent lighting dynamos, capacity from 30 to 450 lights. For further information and particulars apply to or address JOS. F. RANDOLPH, Receiver, 1 Montgomery St., Jersey City, N. J.

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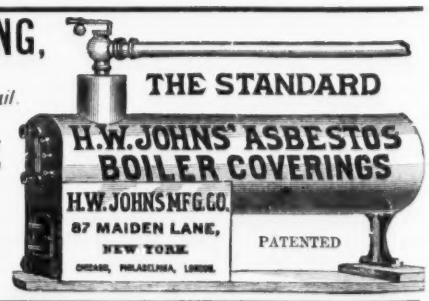


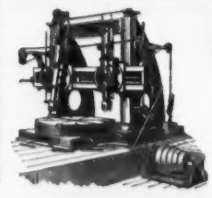

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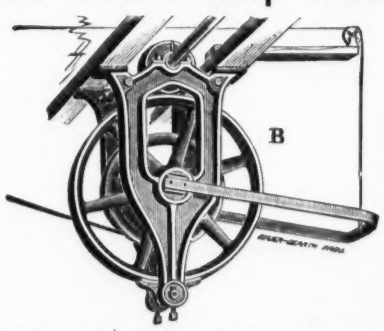
New Patent Whip Hoist.


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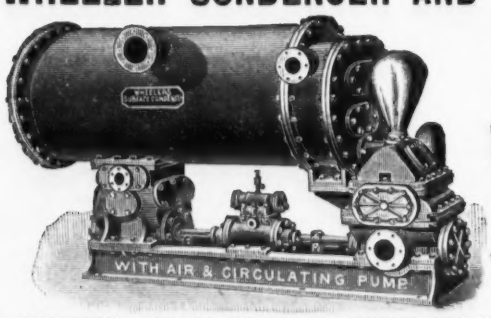

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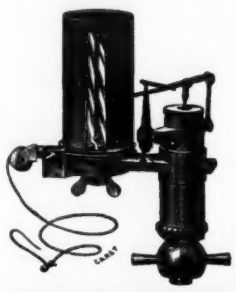

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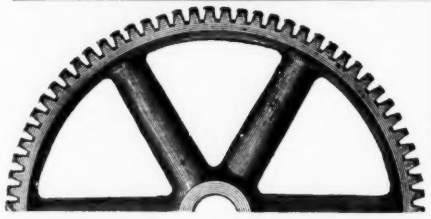

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For Reducing and Pointing Wire.
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Offer remaining tools at the following prices:

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| 1 De Lamater Horizontal Boring Mill, 62″ swing, 18′ bed, and with three boring bars, | $700. |
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| 1 25-ton Traveling Crane, 20′, 9½″ span, | 1,200. |
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| Lot steel tools for Lathes and Planers. Your choice at 10 cents per lb., or the lot at less price. | |
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| Lot Propeller Wheels, from 22″ to 8′ 8″ diameter, at half price. | |
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Time Saving. Easily Adjusted.

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| 2 | ⅞ | .70 | 11 | 2½ | 1.45 |
| 3 | 1 | .70 | 12 | 3 | 1 60 |
| 4 | 1⅛ | .80 | 13 | 3½ | 1.80 |
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| 7 | 1½ | .95 | 16 | 5 | 3.25 |
| 8 | 1¾ | 1.10 | 17 | 5½ | 4.00 |
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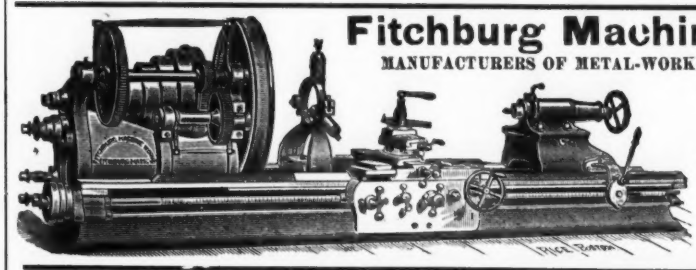

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MANUFACTURERS OF METAL-WORKING MACHINERY.
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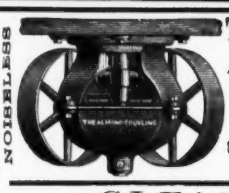


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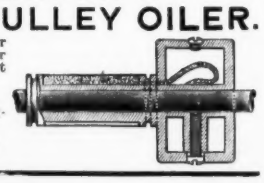

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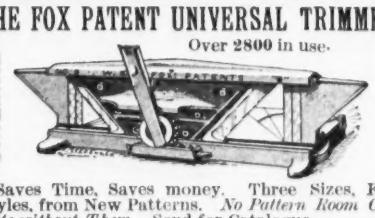

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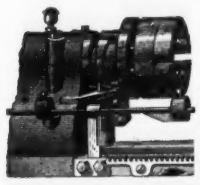

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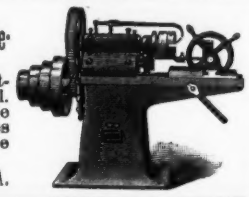

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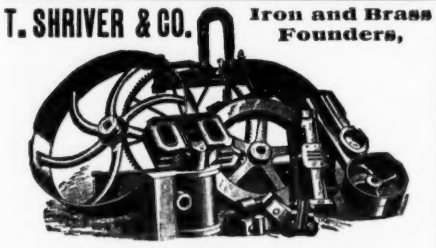

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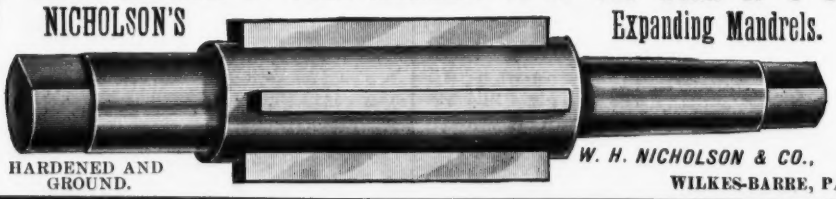

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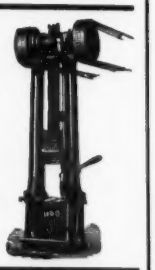

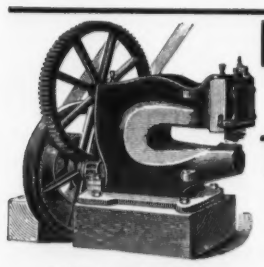

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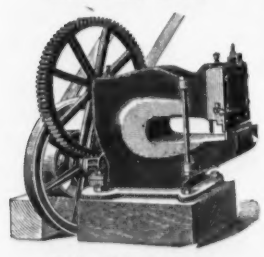

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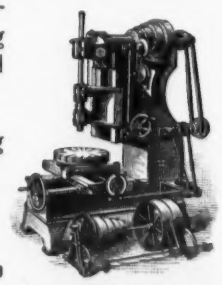

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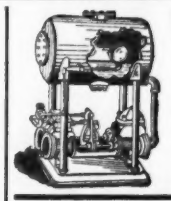

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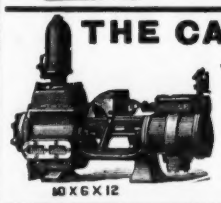

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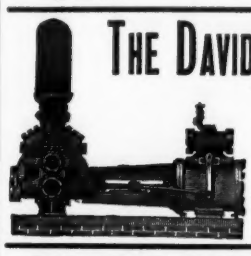

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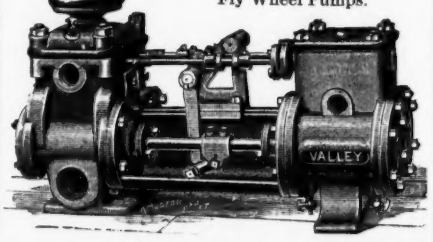


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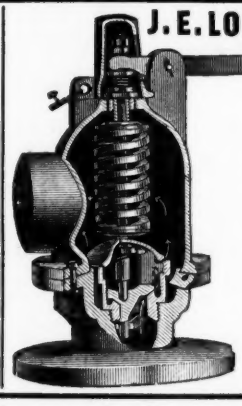

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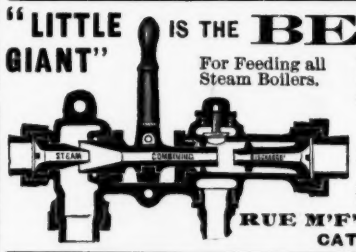


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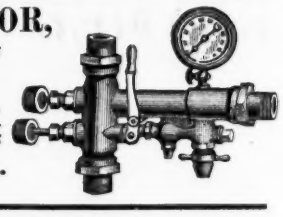

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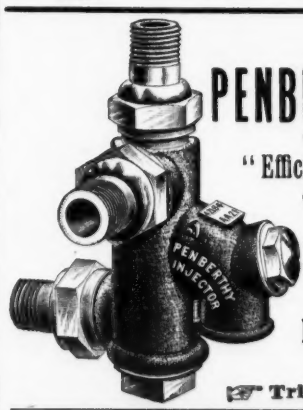


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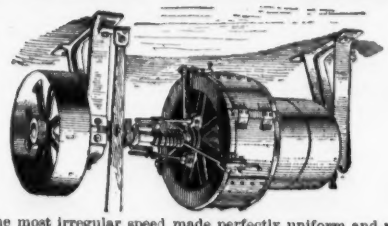

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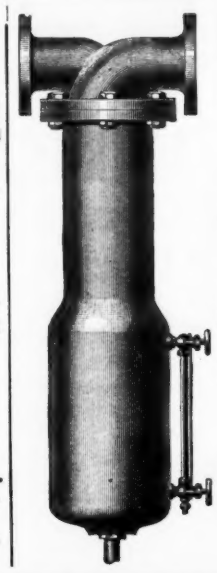

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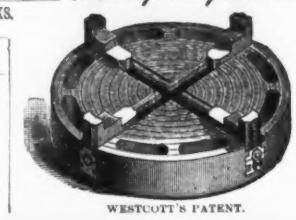

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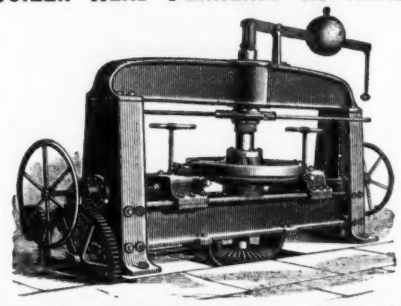

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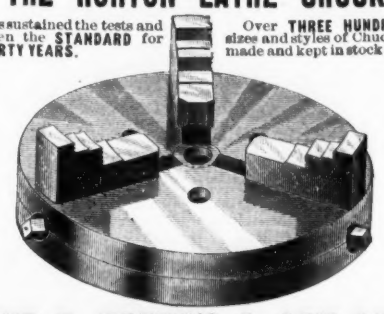

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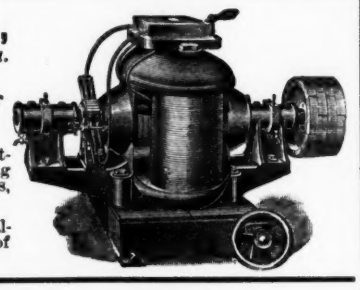

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IT COMBINES THE MAXIMUM OF EFFICIENCY AND DURABILITY WITH THE MINIMUM OF PRICE
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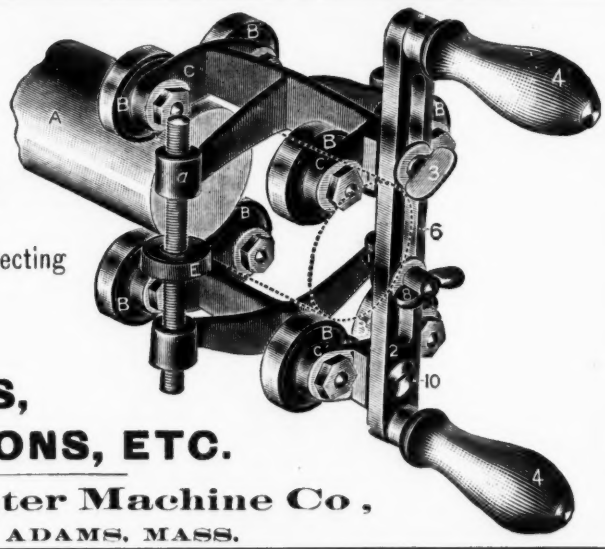
For Finding and Correcting the Center of

**SHAFTS, SPINDLES, GUDGEONS, ETC.**



**James Hunter Machine Co,**

NORTH ADAMS, MASS.

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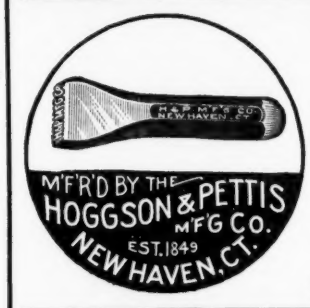


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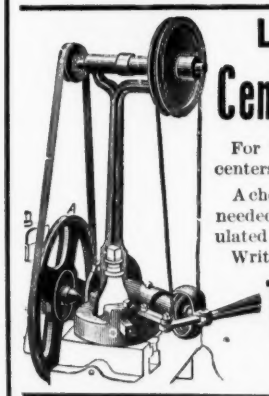

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A cheap and effective tool needed in every well-regulated machine shop.

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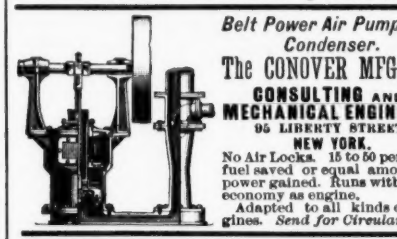

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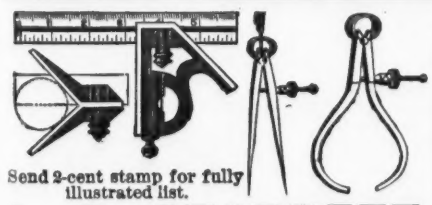

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ARE THE STANDARD THE WORLD OVER, AND GUARANTEED THE BEST CRUCIBLES MADE.

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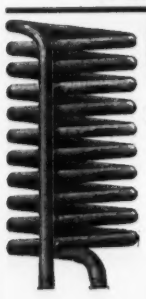

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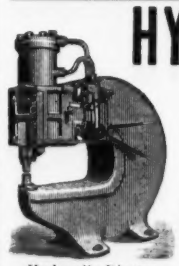

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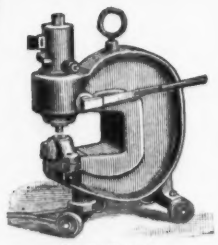
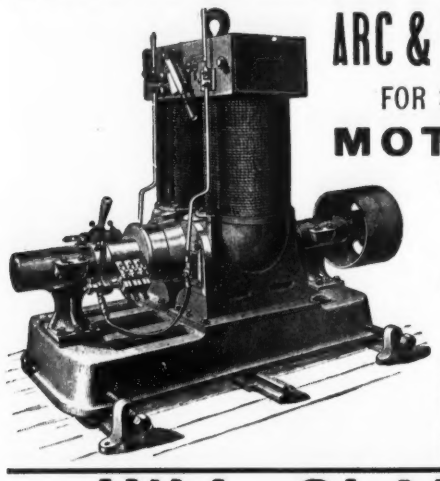


Beam Punch.

# EDISON GENERAL ELECTRIC CO.,



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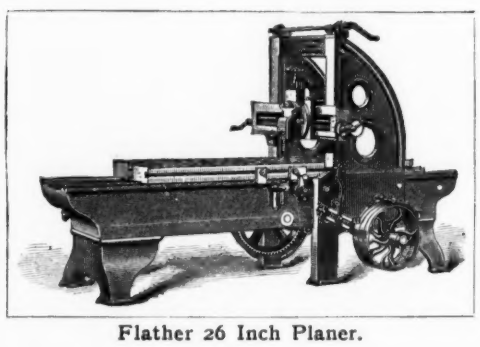

Flather 26 Inch Planer.

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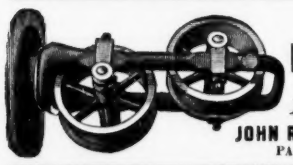

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FOR *Light Belts.*
JOHN ROYLE & SONS,
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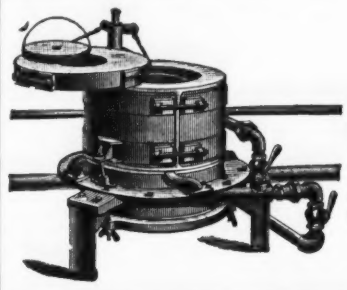

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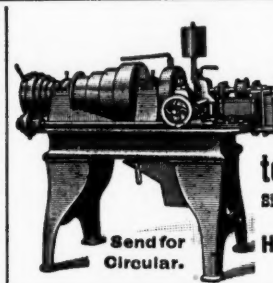

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Sizes 2", 3", 4", 5", 6".
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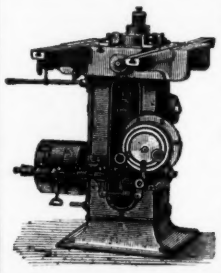

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April 25, 1891. We are very much pleased with it, and think it the best machine on market for simplicity and effective work. DAVIS & COWGILL IRON WORKS, Omaha, Neb.

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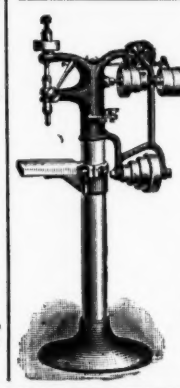

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1, 2, 3, 4 or more Spindles, Sensitive or Automatic Feed.
To drill from 0 to 1-2 inch holes.
The *Latest* and *Best*; most convenient, sensitive and durable Drill on the market.
Have Balanced Spindles and Balanced Tables.
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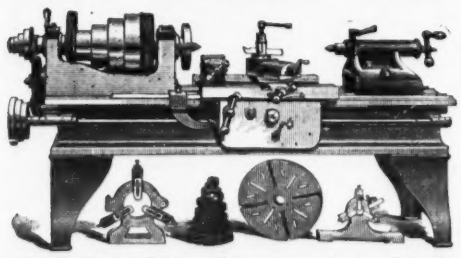

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Taper Attachment, Automatic Stop, Compound Rest, Lead Screw, under front V. All feeds reversed in apron.
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COMPLETE BRASS WORKERS' OUTFITS.

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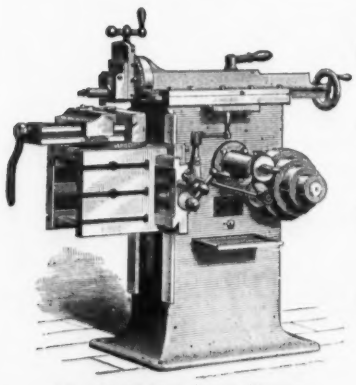

15 and 20-Inch Crank Shaper.
Stroke changed and adjusted while running. Stroke at all times positive.
Invariably plane to a line.
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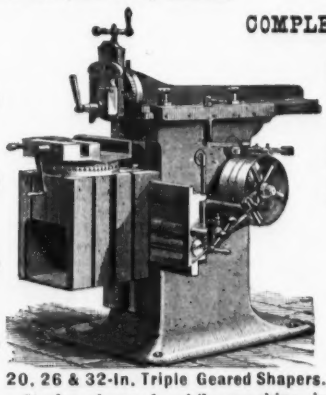

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Stroke changed while machine is running. Shaft can be passed through head of machine and key seat cut in same to any length. Extra heavy vises. Tables slotted on all sides.
Special 26-In. Shaper with auto. down feed.

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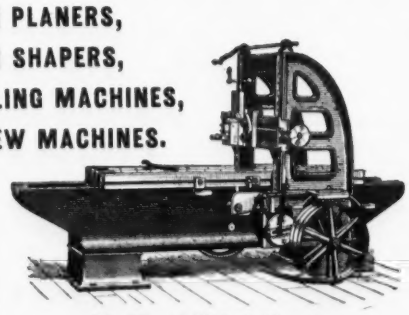

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Extra deep beds and tables. Powerfully geared. Plenty of Metal and designed for extra heavy duty. All Feeds and Shipper operated from both sides.
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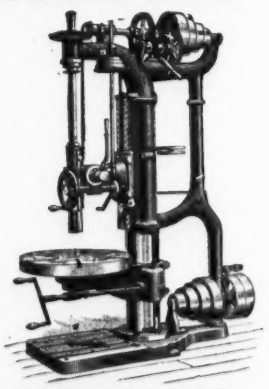

25, 28, 32 and 40-Inch Drills.
Automatic stop to feed. Quick return on right side. Table operated from front. Large cones and long belts.


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Manufacturers of **Morse Patent Straight-Lip Increase Twist Drills.** New Bedford, MASS.

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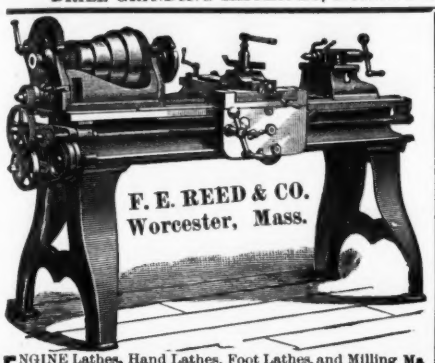


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Lathes from 10 in. to 20in. swing. Largest Variety of Drills manufactured in the world.
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## CASTINGS.
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CORRESPONDENCE INVITED.
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20 to 42 inch swing, with both worm and lever feed, self-feed and back-geared.

Barnes' Patent Friction Driver. Sensitive Drill. Single and Multiple Spindle.

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15 inch swing, 6 foot or 8 foot bed.

They have advantages not found in other machines in this line. It will pay parties desiring to purchase or know more about these machines to send for full description and prices to

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BOWSHER'S BALANCING WAY.

A new idea. A time saver. A tool to take the place of the devices in present use for balancing pulleys, armatures, cutter heads and rotary parts of machinery in general. Substantial. Accurate. Send for circular.

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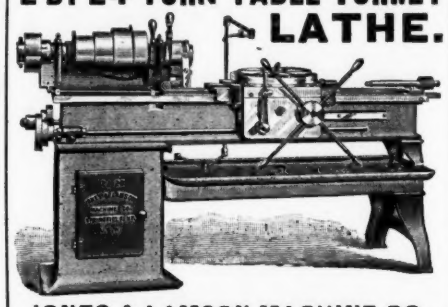
## 2 BY 24 TURN TABLE TURRET LATHE.



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IMPROVED PATENT IRON PLANERS A SPECIALTY.
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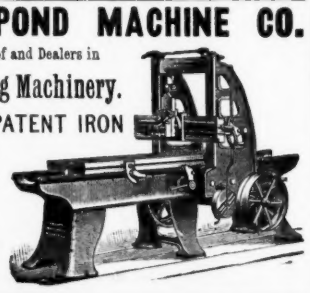

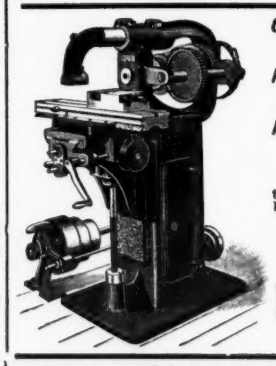

*Complete Universal Milling Machines.*
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All designed to meet the requirements of the best practice.

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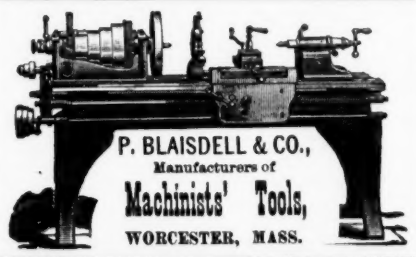

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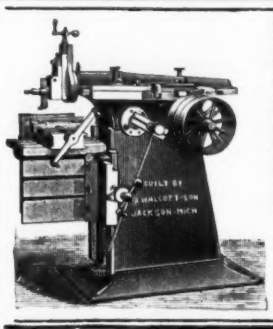


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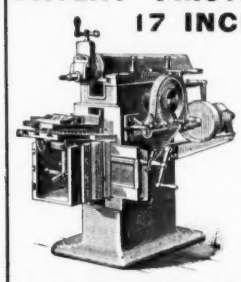

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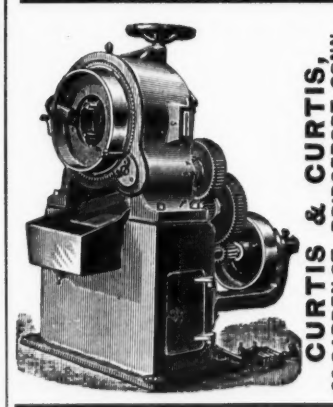

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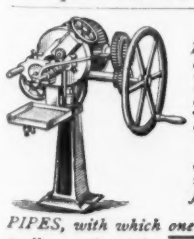

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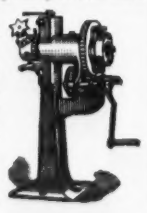

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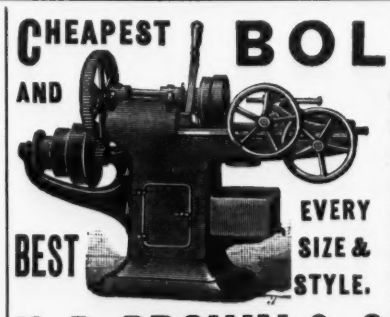

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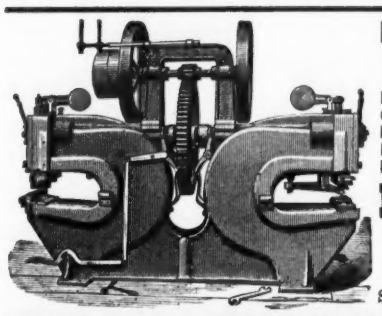

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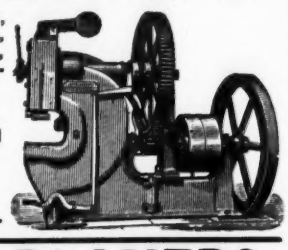

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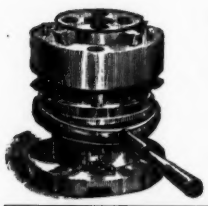

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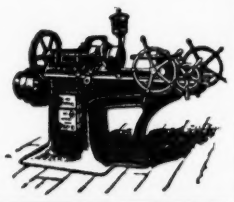

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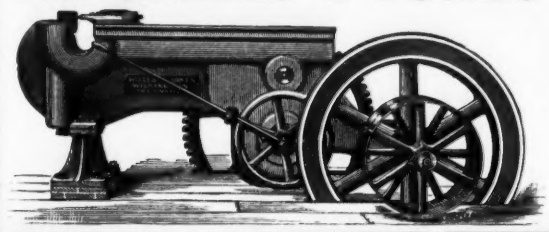

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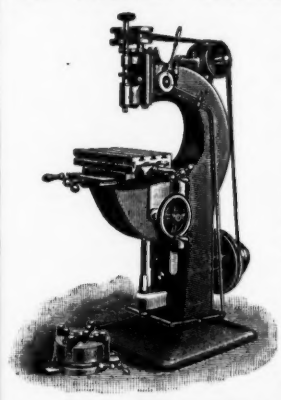

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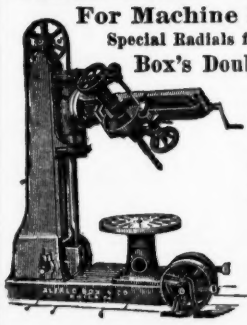

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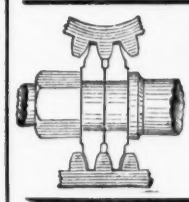

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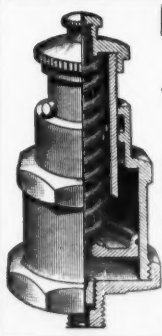

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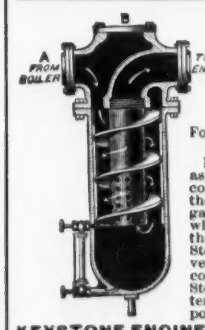


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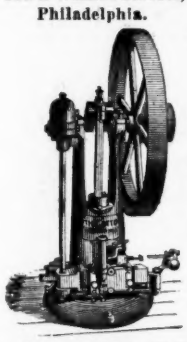

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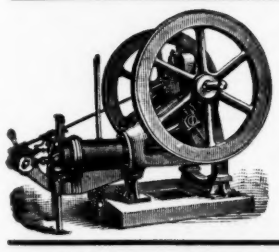

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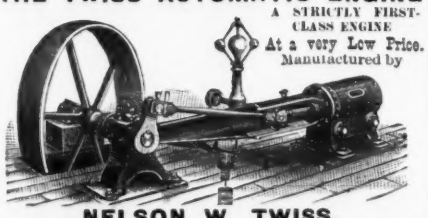

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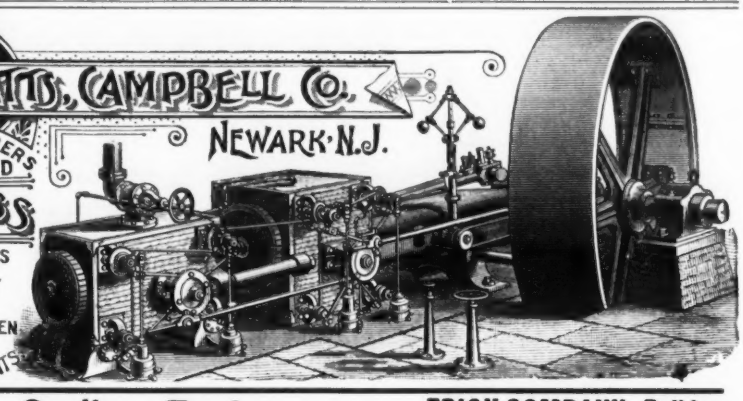

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NON-CONDENSING, CONDENSING COMPOUND.

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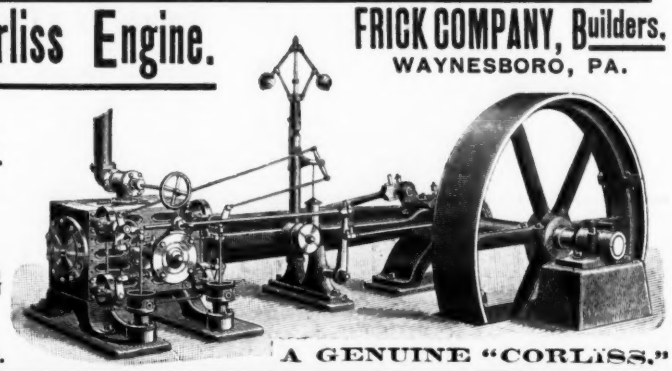
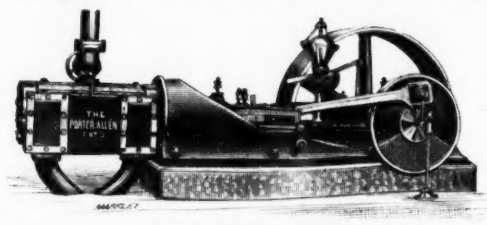


A GENUINE "CORLISS."

## SOUTHWARK FOUNDRY & MACHINE CO., PHILADELPHIA, PA.



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ALSO BUILDERS OF

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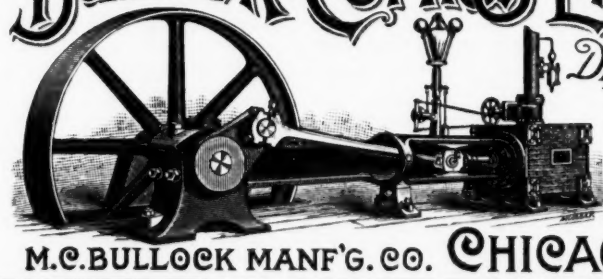
## Bullock-Corliss Engines.



DIAMOND DRILLS —FOR— PROSPECTING.

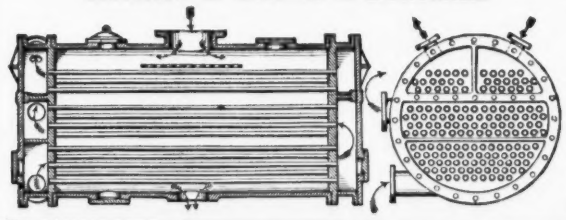
BAND FRICTION HOISTS.

MINING MACHINERY.

**M.C. BULLOCK MANF'G. CO. CHICAGO, U.S.A.**

## SOUTH BROOKLYN STEAM ENGINE WORKS,

Successors to WILLIAM A. LIGHTHALL.



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Lighthall Surface Condensers with Cobb's Improvements. Light Weight Brass Condensers a Specialty. Also Feed Water Heaters, Tube Heads, Screw Glands, Packings, &c.

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Write for Catalogue.

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Water Prevents THE WORK HEATING

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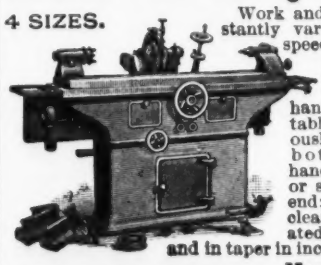

Work and traverse instantly varied to any speed between extremes. Reversing points varied by hand. Pivoted table simultaneously clamped at both ends by hand, has no slot or screws on its end; easy to keep clean; is graduated in ¼ degrees and in taper in inches per foot.

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Owners of Ball Patents and Builders of

## IMPROVED AUTOMATIC CUT-OFF ENGINES.

Under the personal supervision of the inventor, F. H. BALL.

SIMPLE ENGINES,
COMPOUND ENGINES,
TRIPLE EXPANSION ENGINES,

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ELECTRIC LIGHTING PLANTS,
ELECTRIC RAILWAY PLANTS,
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And all Purposes requiring close regulation and economy.

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A new edition of our catalogue is now ready for distribution. The catalogue, with that of our associates, DARLING, BROWN & SHARPE, has 228 pages. It is made for machinists, and mailed without charge to any address upon application.

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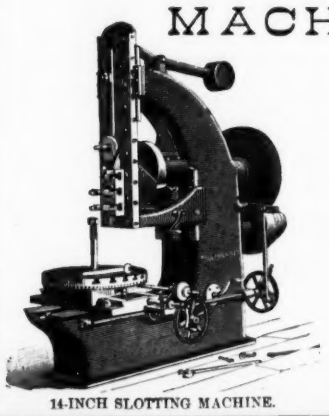

14-INCH SLOTTING MACHINE.

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In sizes from 6½-inch stroke to 54-inch stroke. Cutter-bar counterbalanced and provided with quick return motion. Feeds are longitudinal, transverse and circular, all automatic.

Special Iron and Steel-working machinery for all classes of machine shops.

Correspondence solicited.

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STAMFORD CONN.
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***Remember! THE STRENGTH OF A CHAIN IS ITS WEAKEST LINK.***

*You MAY save a few cents by putting in one cheap link, You MAY save a few cents by putting on one cheap VALVE—BUT, **DO** YOU? You may also repair this break with ANOTHER cheap link or valve, but can you AFFORD to, even if the valve COSTS YOU **NOTHING?** Decidedly You CANNOT. Why not get at once a **GENUINE JENKINS BROS. VALVE,** STAMPED WITH TRADE MARK? You accomplish nothing by getting an IMITATION Jenkins Bros. Valve—there are over fifty on the market—in fact, you have only SPENT A LITTLE MORE MONEY and still your chain BREAKS AT THE SAME LINK.* ***JENKINS BROS., New York, Philadelphia, Boston & Chicago.***

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# $150.00 REWARD.

The remarkable increase in the sale of our Improved Machine Tools has induced us to still further place their merits before every user of this class of machinery both in America and Europe.

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In view of this fact we will, on July 1st, 1891, pay one hundred dollars ($100.00) for the first and fifty dollars ($50.00) for the second best plan for advertising our line of Improved Tools.

The plans must embody three conditions: First, they must be NOVEL; Second, FEASIBLE; Third, Cost must justify the advertisement being used in large lots.

Competition open to every one, except those in our employ. Communications may be addressed to either of our houses.

Eastern House. No. 64 CORTLANDT STREET, New York City.
**The Lodge & Davis Machine Tool Co.,**
Works: CINCINNATI, OHIO.
Western House, No. 68 & 70 S. CANAL ST., Chicago, Ill.
N. B.—See "Advertisement," page 16.

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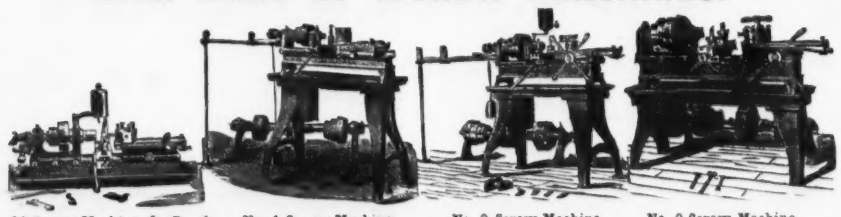
## OUR LINE OF SCREW MACHINES.



No. 00 Screw Machine, for Bench. No. 1 Screw Machine. No. 2 Screw Machine. No. 3 Screw Machine.

Can Furnish with or without Wire Feed.

## THE CARVIN MACHINE COMPANY,
Manufacturers of, and Dealers in, all kinds of

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Universal and Plain Milling Machines, Drill Presses, Screw Machines, Hand and Engine Lathes, Planers, Profilers, Chucking Machines,
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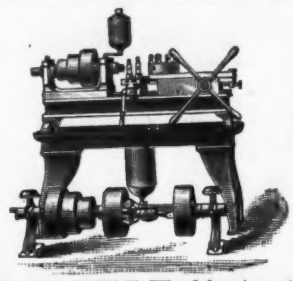
48 in. and 66 in. Swing.



## Double Head Traverse Drills
For ⅝ in., 3 in. and smaller holes.
**Revolving Head Drilling Machines.**

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# BILLINGS' BALL PENE MACHINISTS' HAMMERS.

DROP FORGED — OF — BEST TOOL STEEL

4 SIZES
¼ LB.
¾ "
1 "
1¼ "

MANUFACTURED AND FOR SALE BY
THE BILLINGS & SPENCER CO.
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## WARNER & SWASEY,
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For Iron and Brass Work.
SMALL TOOLS & FIXTURES.
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Manufacturer of ENGINE LATHES from 16 to 48 in. swing. Cuts, Photographs and Prices furnished on application.
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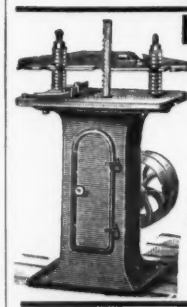

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A SPECIALTY.
SEND FOR LIST OF
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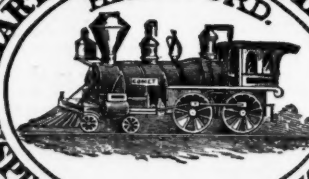


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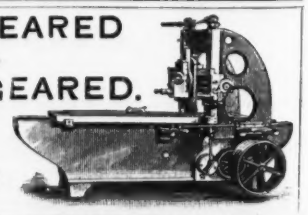

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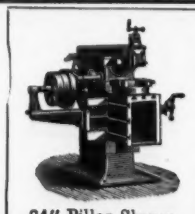

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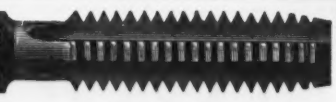

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